



Richland Operations Office

Project and Technical Overview

(Taken from the 2015 Hanford Lifecycle Scope, Schedule and Cost Report)
Approved for Public Release;
Further Dissemination Unlimited

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TERMS

CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CH	contact-handled
CSB	Canister Storage Building
CWC	Central Waste Complex
D&D	decontamination and decommission
D4	deactivation, decontamination, decommission, and demolition
DOE	U.S. Department of Energy
DQO	data quality objectives
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EM	U.S. Department of Energy, Office of Environmental Management
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
FFTF	Fast Flux Test Facility
FY	fiscal year
HAB	Hanford Advisory Board
HAMMER	Hazardous Materials Management and Emergency Response; also known as the Volpentest HAMMER Training and Education Center
HFFACO	<i>Hanford Federal Facility Agreement and Consent Order</i>
HLW	high-level waste
HQ	U.S. Department of Energy, Headquarters
HWMA	<i>Hazardous Waste Management Act</i> (Washington State)
IDF	Integrated Disposal Facility
IHLW	immobilized high-level waste
ISS	interim safe storage
LAW	low-activity waste
LDR	Land Disposal Restrictions
LERF	Liquid Effluent Retention Facility
LM	Legacy Management
LTS	long-term stewardship
MLLW	mixed low-level waste
MSC	Mission Support Contract
NEPA	<i>National Environmental Policy Act</i>
NM	nuclear materials
NRDAR	Natural Resource Damage Assessment and
Restoration OMB	Office of Management and Budget
ORP	U.S. Department of Energy, Office of River Protection
OU	operable unit
PBS	project baseline summary
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PRC	Plateau Remediation Contract
PUREX	Plutonium Uranium Extraction (Plant)
RCCC	River Corridor Closure Contract
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>

TERMS cont.

REDOX	Reduction-Oxidation Facility (S Plant)
RH	remote-handled
RI/FS	remedial investigation/feasibility study
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
RPP	River Protection Project
RTD	remove, treat and dispose
S&M	surveillance and maintenance
SNF	spent nuclear fuel
SST	single-shell tank
TBD	to be determined
TEDF	Treated Effluent Disposal Facility
TOC	Tank Operations Contract
TPA	Tri-Party Agreement
Tri-Party agencies	U.S. Department of Energy, U.S. Environmental Protection Agency, and Washington State Department of Ecology
TRU	transuranic
TRUM	transuranic mixed (waste)
TSD	treatment, storage, and disposal
USDOE	U.S. Department of Energy
WBS	work breakdown structure
WESF	Waste Encapsulation and Storage Facility
WIPP	Waste Isolation Pilot Plant
WRAP	Waste Receiving and Processing (Facility)
WTP	Waste Treatment and Immobilization Plant
WTPC	Waste Treatment and Immobilization Plant Contract

SECTION 1: HANFORD CLEANUP-OVERVIEW

The 586-square-mile Hanford Site is located along the Columbia River in southeastern Washington State (Figure 1-1). Beginning in the 1940s with the Manhattan Project, Hanford played a pivotal role in the nation's defense, eventually producing approximately 74 tons of plutonium — nearly two-thirds of all the plutonium recovered for government purposes in the United States. Today, the Hanford Site includes numerous former nuclear material production areas, active and closed research facilities, waste storage and disposal sites, and large areas of natural habitat and buffer zones all underlain by groundwater.

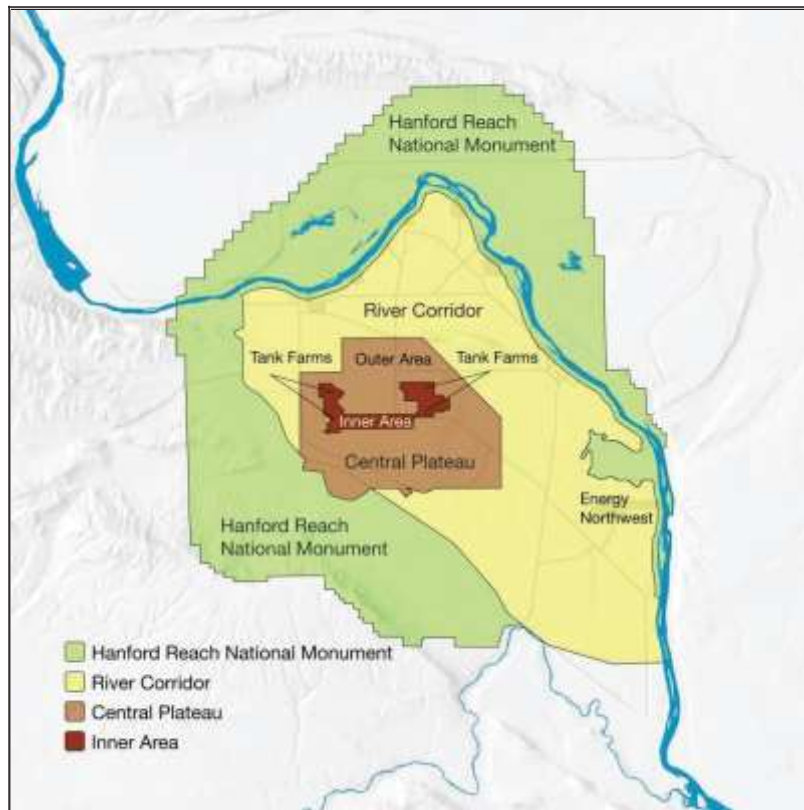


Figure 1-1. Hanford Site Map Showing Principal Areas Designated for Cleanup.

Under the direction of DOE, the Hanford workforce is now engaged in the environmental cleanup of contaminated facilities, groundwater, and soil. Hanford cleanup is further described in *Hanford Site Cleanup Completion Framework* (DOE/RL-2009-10).

Hanford Cleanup Goals

The overarching goals for cleanup are noted in Table 1-2. These goals embody more than 20 years of dialogue among the Tri-Party agencies, Tribal Nations, State of Oregon, stakeholders, and the public. The goals carry forward key values captured in earlier forums such as the Hanford Future Site Uses Working Group, the Tank Waste Task Force, Hanford Summits, and HAB Exposure Scenario Workshops, as well as more than 270 advice letters issued by the HAB (<http://www.hanford.gov/page.cfm/hab>). These goals help guide all aspects of cleanup. Cleanup activities at various areas of the site support the achievement of one or more of these goals. These goals help set priorities to apply resources and sequence cleanup efforts for the greatest benefit.

These goals reflect DOE's recognition that the Columbia River is a critical resource for the people and ecology of the Pacific Northwest. The 50-mile stretch of the river that flows through the Hanford Site is known as the Hanford Reach and is the last free-flowing section of the Columbia River in the United States. As one of the largest rivers in North America, its waters support a multitude of uses that are vital to the economic and environmental wellbeing of the region and it is particularly important in sustaining the culture of Native Americans.

Table 1-2. Cleanup Goals Identified for the Hanford Site.¹

Goals for Cleanup	
Goal 1:	Protect the Columbia River.
Goal 2:	Restore groundwater to its beneficial use to protect human health, the environment, and the Columbia River.
Goal 3:	Clean up River Corridor waste sites and facilities to: <ul style="list-style-type: none"> • Protect groundwater and the Columbia River • Shrink the active cleanup footprint to the Central Plateau • Support anticipated future land uses.
Goal 4:	Clean up Central Plateau waste sites and facilities to: <ul style="list-style-type: none"> • Protect groundwater and the Columbia River • Minimize the footprint of areas requiring long-term waste management activities • Support anticipated future land uses.
Goal 5:	Safely mitigate and remove the threat of Hanford's tank waste: <ul style="list-style-type: none"> • Safely store tank waste until it is retrieved for treatment • Safely and effectively immobilize tank waste • Close tank farms and mitigate the impacts from past releases of tank waste to the ground.
Goal 6:	Safely manage and transfer legacy materials scheduled for offsite disposition, including special nuclear material (including plutonium), spent nuclear fuel, transuranic waste, and immobilized high-level waste.
Goal 7:	Consolidate waste treatment, storage, and disposal operations on the Central Plateau.
Goal 8:	Develop and implement institutional controls and long-term stewardship activities that protect human health, the environment, and Hanford's unique cultural, historical, and ecological resources after cleanup activities are completed.
¹ DOE/RL-2009-10, 2013, <i>Hanford Site Cleanup Completion Framework</i> , Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.	

Hanford Cleanup and Management Areas

Hanford cleanup focuses on two broad geographic areas: The River Corridor and the Central Plateau. Tank Waste Cleanup is a separate cleanup component located in the Central Plateau. The River Corridor includes approximately 220 square miles of the Hanford Site, encompassing the 100 and 300 Areas along the south shore of the Columbia River, portions of the 400 and 600 Areas, and the contiguous lands that extend to the Central Plateau boundaries. This includes a considerable land area not directly affected by production operations (non-operational areas). The 100 Area contains nine retired plutonium production reactors, numerous support facilities, solid and liquid waste disposal sites that have contaminated soil and groundwater. The 300 Area, located north of the City of Richland, contained fuel fabrication facilities, nuclear research and development facilities, and associated solid and liquid waste disposal sites that have contaminated soil and groundwater. The non-operational areas include substantial land area adjacent to the 100 and 300 Areas and extending to the Central Plateau that was never used for production operations.

For sites in the River Corridor, the goal of remedial action is to restore groundwater to drinking water standards wherever practicable, and to achieve ambient water quality standards in the groundwater prior to it discharging into the Columbia River. In those instances where remedial

action objectives are not achievable in a reasonable time frame, or are determined to be technically impracticable, programs will be implemented to limit contaminant migration and prevent exposure to contaminated groundwater. River Corridor Cleanup work also removes sources of contamination, which are close to the Columbia River, to the Central Plateau for final disposal. The intent is to shrink the footprint of active cleanup to within the 75-square-mile area of the Central Plateau by removing excess facilities and remediating waste sites.

Cleanup actions will support anticipated future land uses consistent with the Hanford Reach National Monument, where applicable, and the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE/EIS-0222-F).

The River Corridor has been divided into six geographic areas to achieve source and groundwater remedy decisions. These decisions will provide comprehensive coverage for all areas within the River Corridor and will incorporate ongoing interim action cleanup activities. Cleanup levels will be achieved that support the anticipated land uses of conservation and preservation for most of this area and industrial use for the 300 Area. At the conclusion of cleanup actions, the Federal Government will retain ownership of most land in the River Corridor and will implement long-term stewardship (LTS) activities to ensure protection of human health and the environment.

The Central Plateau consists of about 75 square miles in the central portion of the Hanford Site and includes an Inner Area (~10 square miles) and Outer Area (~65 square miles). The Inner Area contains major nuclear fuel processing, waste management, and disposal facilities. The Inner Area will be dedicated to long-term waste management and containment of residual contamination. The Outer Area is that portion of the Central Plateau outside the boundary of the Inner Area. The Outer Area will be remediated to be protective of human health, the environment and groundwater. Cleanup levels will support future reasonably anticipated land uses. Cleanup of the Outer Area is planned to be completed in the 2016 to 2020 time period as funding allows. Completing cleanup of the Outer Area will shrink the footprint of active cleanup by an additional 65 square miles leaving just the Inner Area remaining.

Cleanup of the Central Plateau is a highly complex activity because of the large number of waste sites, surplus facilities, active treatment and disposal facilities, and areas of deep soil contamination. Past discharges of more than 450 billion gallons of liquid waste and cooling water to the soil have resulted in about 73 square miles of contaminated groundwater across the site. Today, some plumes extend far beyond the plateau. Containing and remediating these plumes remains a high priority. For areas of groundwater contamination in the Central Plateau, the goal is to restore the aquifer to achieve drinking water standards. In those instances where remediation goals are not achievable in a reasonable time frame, programs will be implemented to contain the plumes, prevent exposure to contaminated groundwater, and evaluate further risk reduction opportunities as new technologies become available. Near-term actions will be taken to control plume migration until remediation goals are achieved.

At the completion of cleanup efforts, some residual hazardous and radioactive contamination will remain, both in surface disposal facilities and in subsurface media within portions of the Inner Area. DOE's goal is to limit the area used for long-term waste management activities that require institutional controls to ensure protection of human health and the environment. Significant portions of the Hanford Site have been designated and preserved as part of the Hanford Reach National Monument (Figure 1-1). Much cleanup work has been accomplished

within the designated monument area, and remaining work is expected to be completed within the next few years either as part of the River Corridor or Central Plateau cleanup projects. DOE is coordinating with the U.S. Department of Interior, U.S. Fish and Wildlife Service, and other agencies to provide care and maintenance of the Hanford Reach National Monument lands.

Cleanup Decisions and Alternatives

Cleanup is achieved through an ongoing process for making and then implementing cleanup decisions in accordance with approved work plans and procedures, which are the bases for performing cleanup actions. When making cleanup decisions, the Tri-Party agencies ensure compliance with applicable laws and regulations, compare various cleanup alternatives, consider the interests of the public and other affected parties, consult with Tribal Nations, and document selected cleanup actions in legally binding records.

In portions of the cleanup, the Tri-Party agencies have agreed to schedule final cleanup decisions to be made at a time when more information and experience can be gained, or after certain facilities are no longer needed. For example, decisions on cleaning up the T Plant Canyon Building in the Central Plateau will not be made until the Tri-Party agencies have determined when T Plant will not be needed to support Hanford cleanup.

Table 1-3 lists the cleanup actions for which final cleanup decisions have not yet been made.

Table 1-3. Cleanup Actions for which Final Decisions Have Not Been Made.

River Corridor Cleanup Actions	
<ul style="list-style-type: none"> • Disposition N Reactor • Disposition 100 Area K West Basin • Remediate 100 Area Contaminated Soil Sites • Restore 100-BC-5 Groundwater OU to Beneficial Use • Restore 100-KR-4 Groundwater OU to Beneficial Use 	<ul style="list-style-type: none"> • Restore 100-NR-2 Groundwater OU to Beneficial Use • Restore 100-HR-3 Groundwater OU to Beneficial Use • Disposition 300 Area Facilities Retained by PNNL • Disposition 100 Area former Orchard Contaminated Soil Sites (100-OL-1 OU)
Central Plateau Cleanup Actions	
<ul style="list-style-type: none"> • Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU) • Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, 200-CW-3 OUs) • Disposition Below-Grade Portions of Plutonium Finishing Plant • Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU) • Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU) • Disposition PUREX Storage Tunnels (200-CP-1 OU) • Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU) • Disposition T Plant Canyon Building/Associated Waste Sites • Disposition Cesium/Strontium Capsules • Remediate 200-SW-1 OU 	<ul style="list-style-type: none"> • Disposition Remaining Waste Treatment, Storage, and Disposal Facilities • Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks (200-IS-1 OU) • Remediate Land Disposal Units (200-SW-2 OU) • Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU) • Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU) • Disposition FFTF Complex • Disposition Remaining Buildings and Facilities within FFTF Complex • Disposition Remaining Inner Area Buildings and Facilities • Remediate Contaminated Deep Vadose Zone (200-DV-1 OU) • Restore 200 West Groundwater (200-UP-1 OU) to Beneficial Use

Table 1-3. Cleanup Actions for which Final Decisions Have Not Been Made. (cont.)

<ul style="list-style-type: none"> Disposition Remaining Liquid Waste Disposal Facilities 	<ul style="list-style-type: none"> Restore 200 East Groundwater (200-PO-1/200-BP-5 OUs) to Beneficial Use
Tank Waste Cleanup Actions	
<ul style="list-style-type: none"> Tank Retrieval and Single-Shell Tank Farm Closure Tank Waste Treatment Secondary Waste Treatment 	<ul style="list-style-type: none"> Double-Shell Tank Closure Waste Treatment and Immobilization Plant Closure
FFTF = Fast Flux Test Facility. OU = operable unit. PNNL = Pacific Northwest National Laboratory.	PUREX = Plutonium Uranium Extraction (Plant). REDOX = Reduction-Oxidation Facility (S Plant).

Annual Budget Formulation Process

Each year, DOE formulates budget requests for Congressional appropriations. The planning cycle begins between December and January, nearly 2 years before the start of a budgeted fiscal year. The process begins with budget formulation where funding requirements are analyzed, prioritized, requested and received. Budget requests are submitted by the DOE field offices to HQ in early spring and continue with post-formulation monitoring and responding to questions to estimate impacts of actual or potential changes to budget requests. The process ends with receipt of Congressional appropriations. DOE's budget process occurs in four distinct phases:

1. **Field Budget Process.** This is the first phase of DOE's annual budget formulation process. RL and ORP submit field budget data to HQ for use in the corporate review budget process.
2. **HQ Corporate Review Budget Process.** The HQ organizations use field budget data and spring planning decisions to develop initial organizational budget requests that are jointly evaluated and considered in DOE's internal budget review.
3. **OMB Budget Review Process.** This process is the principal mechanism for preparing DOE's annual budget submission to the OMB, which is responsible for assembling the President's annual budget request to Congress.
4. **Congressional Budget Review Process.** This process determines DOE's final appropriations for the next Federal fiscal year, based on policy determinations in conjunction with Federal budget deliberations by Congress.

Annual budgets developed by DOE and appropriated for spending by Congress are allocated to the responsible DOE projects. Congressional budgets commonly provide different allocations, include additional requirements, or provide other directions that can affect project planning. If adjustments are required, DOE goes through a scheduling and resource-leveling process to adjust plans and accommodate the authorized budget. Sometimes this can result in cost and schedule changes to reconfigure activities resulting from budget or other constraints. DOE must determine the appropriations that will be used to fund each task to comply with applicable budget direction. Based on final Congressional appropriations, budget formulation, project planning and re-planning are intertwined and involve iterative processes with similar steps. DOE's process for defining and managing projects and their baseline summaries are described below.

U.S. Department of Energy Project Formulation Process

DOE follows a structured approach that organizes all EM activities into discrete projects. The following summarizes key components of DOE's cleanup project management approach.

Project Baseline Summary (PBS). EM projects that have common attributes, such as geographic location or activity type, typically are grouped as a PBS. Congressional funding authorizations typically are also allocated by PBS. Each PBS contains a logical grouping of work activities organized in discrete projects or activities by establishing technical scope, schedule and cost baselines; defining performance metrics; and providing financial history, budget request justification, as well as other information; e.g., programmatic risk and compliance drivers. DOE may define a cleanup project as the entire PBS, or a project may be a portion of a single or multiple PBSs. A PBS or project may include operations and facility support activities such as surveillance and maintenance (S&M).

Work Breakdown Structure (WBS). The work scope associated with each PBS is further organized into discrete WBS elements. The WBS provides a product/activities-oriented system to arrange, define, and depict all work in a structured framework. This step is essential to developing comprehensive bases for planning and managing project-specific scope, schedule and cost. Whether the government or a contractor performs the elements, the structure must be compatible with cost estimating and scheduling requirements.

Resource Allocation. The next step is to define the resources necessary to execute each WBS element. Resources include labor, materials, and equipment. These resources are a part of work packages, which define the work for each WBS element. Planning packages are used when the work has not been completely defined. Budget is assigned to planning packages based on a mature estimate until such time as a work package can be developed.

Project Master Schedule. With a solid WBS and well-developed work packages in place, DOE can develop a master schedule that contains a reliable estimate of the total time required to accomplish each task and the sequence of execution. The master schedule should reveal tasks that must be completed or partially completed before other tasks begin. These interrelationships help define the project's critical path (the sequence of activities that must be completed on schedule for the entire project to be completed on schedule). Task schedules evolve by balancing the work to be done against the required completion date to achieve project milestones.

Resource Leveling. All resources are finite and not all work can be accomplished simultaneously, so work must be organized to ensure existing resources are not overtaxed or underutilized; e.g., an engineering or craft labor individual cannot be scheduled to accomplish more than one work package simultaneously, and the same piece of equipment cannot be operated in more than one location at a time. The sequencing of tasks, therefore, addresses not only the order of things to be accomplished, but the availability and optimal use of resources. Resource leveling may result in the need to revise or update a project's master schedule.

Uncertainty and Project Risk. Risk management is essential for project management. Cost and schedule uncertainty are included in the development of Total Project Cost and the approved DOE planning case and are reserved to accommodate additional work scope related to risk events that may occur from conditions and events that were not known during project planning and other unanticipated changes or uncertainties. This includes estimates for cost and schedule uncertainty based on risk analysis methods that comply with DOE guidelines and orders.

Depending on the complexity of work scope, project maturity, contract period of performance, etc., DOE's contractors typically plan their near-term work down to Level 6 and further to manage and schedule designs, approvals, and resources needed for their projects. This scope, schedule and cost information rolls up and is included in the upper tier planning information. Table 1-6 is an example of work planning to Level 6 and how it incorporates Levels 1 through 5.

Table 1-6. Example of a Level 6 Work Breakdown Structure.

PBS (Level 1)	RL-0041 Nuclear Facility D&D–River Corridor
Level 2	041.03 Field Remediation Closure
Level 3	041.03.02 Field Remediation – 100-D Area
Level 4	041.03.02.02 Field Remediation – 100-DR-1
Level 5	041.03.02.02.06 Field Remediation – Burial Grounds – 100-DR-1
Level 6	041.03.02.02.06.01 Remediate Burial Ground – 100-D-32
	041.03.02.02.06.02 Remediate Burial Ground – 100-D-33
	041.03.02.02.06.04 Remediate Burial Ground – 100-D-41
	041.03.02.02.06.05 Remediate Burial Ground – 100-D-45
	041.03.02.02.06.06 Remediate Burial Ground – 126-D-2
D&D = decontamination and decommission.	
PBS = project baseline summary	
RL = U.S. Department of Energy, Richland Operations Office.	

For years beyond the contractor's near-term work, DOE maintains "out-year" planning estimates for the remaining cleanup. Out-year planning estimates are not as well developed as near-term planning (typically no further than Level 3 or Level 4).

Cost information will be updated each year to reflect work completion, recent decisions, and other changes affecting the lifecycle scope (e.g., upgrades or infrastructure modernization to support major projects). Sections 3 through 6 summarize information at PBS Level 2, including work breakdown for each PBS, descriptions of the lifecycle work scope and associated work elements, and schedules for completing the work elements.

Each chapter provides estimated cleanup costs for corresponding work elements, and includes costs that are not work elements directly performed under the respective PBS; e.g., Site-wide Services is not a work element directly performed in each PBS, but an estimated support cost for the entire PBS lifecycle (see Section 6).

SECTION 2: HANFORD SITE LIFECYCLE SCOPE

Cleanup consists of three major scope components: River Corridor, Central Plateau, and Tank Waste (the Tank Waste component is contained geographically within the Central Plateau). Cleanup also includes Mission Support activities that provide key infrastructure and services for Hanford. Cleanup is a complex task that involves multiple contractors performing discrete, yet interdependent, scopes of work. The current prime contracts related to each PBS are noted in Table 2-1. The scope of cleanup work is broken down into a series of PBSs. Table 2-1 describes the general scope of each PBS and the section of this document addressing each PBS.

Table 2-1. Hanford Project Baseline Summaries (PBS)–RL and ORP Contractors.

Section	PBS	Official Title	Alternate Titles	General Scope	Prime Contract
SECTION 3 – RIVER CORRIDOR CLEANUP					
River Corridor (Section 3.1)	RL-0041	Nuclear Facility D&D–River Corridor Closure Project	None	Cleanup of the River Corridor waste sites and facilities, including placing the reactors in interim safe storage (this scope excludes groundwater remediation, which is addressed through PBS RL-0030).	RCCC
				Includes 105-KW SNF Basin deactivation and removal work scope that was transferred from RL-0012 in FY 2012.	PRC
River Corridor (Section 3.2)	RL-0012	SNF Stabilization and Disposition	K Basins Closure Project	Removal of the K Basin sludge, found SNF and fuel scrap.	PRC
River Corridor (Section 3.3)	TBD	TBD	Final Reactor Disposition	Disposition of 100 Area production reactors (excluding B Reactor).	TBD
SECTION 4 – CENTRAL PLATEAU CLEANUP					
Central Plateau (Section 4.1)	RL-0030	Soil and Water Remediation–Groundwater / Vadose Zone	Groundwater Project	Decision-making process for groundwater and waste sites and Hanford Site-wide groundwater remediation.	PRC
Central Plateau (Section 4.2) and Mission Support (Section 6.2)	RL-0040	Nuclear Facility D&D–Remainder of Hanford	This PBS has two parts: 1. RL-0040.01.1 Central Plateau Remediation	1. Cleanup of the Central Plateau waste sites and facilities, including canyon facilities.	PRC
			2. RL-0040.01.2 Infrastructure and Services or Mission Support Site-wide Services	2. Management, repair, and capital upgrades to infrastructure and other site-wide services.	MSC
Central Plateau (Section 4.3)	RL-0042	Nuclear Facility D&D–Fast Flux Test Facility Project	None	Demolition of the Fast Flux Test Facility and associated waste sites and structures.	PRC
Central Plateau (Section 4.4)	RL-0013C	Solid Waste Stabilization and Disposition–200 Area	Solid and Liquid Waste Disposition Project	Waste management operations including treatment, storage, and disposal of Hanford Site waste streams and offsite wastes ¹ .	PRC
SECTION 5 – TANK WASTE CLEANUP					
Not Included					

Table 2-1. Hanford Project Baseline Summaries (PBS)–RL and ORP Contractors (cont.)

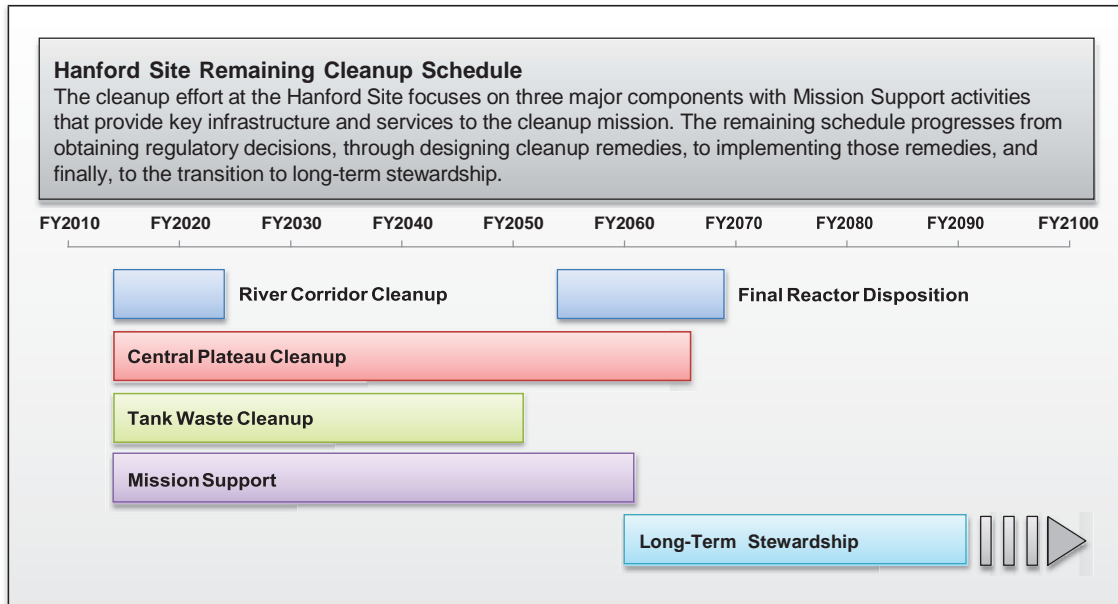
SECTION 6 – MISSION SUPPORT					
Mission Support (Section 6.1)	RL-0020	Safeguards and Security	None	Protection of the Hanford Site, special materials, resources, and workers.	MSC
Mission Support (Section 6.4)	RL-LTS	Long-Term Stewardship (LTS)	Post-cleanup LTS ²	Infrastructure support, surveillance and maintenance, community support, and management activities following completion of cleanup activities.	TBD
¹ Waste from other sites will not be received until the Waste Treatment and Immobilization Plant is operational. ² See Section 6.2 for the current ongoing LTS program. D&D = decontamination and decommission. LCR = Lifecycle Report. LTS = long-term stewardship. MSC = Mission Support Contract. NM = nuclear materials. ORP = U.S. Department of Energy, Office of River Protection. PBS = project baseline summary. PFP = Plutonium Finishing Plant. PRC = Plateau Remediation Contract. RCCC = River Corridor Closure Contract. RL = U.S. Department of Energy, Richland Operations Office. SNF = spent nuclear fuel. TBD = to be determined. TOC = Tank Operations Contract. WTPC = Waste Treatment and Immobilization Plant Contract.					

Hanford Cleanup Schedule

The remaining cleanup schedule covers activities for waste cleanup and waste management, leading to transition of portions of the Hanford Site to LTS. Sections 3 through 6 present additional schedule details for the River Corridor, Central Plateau, and Mission Support activities.

To support cleanup, RL has responsibility for Mission Support activities related to safeguards and security, community and regulatory support, and Hanford Site infrastructure and site-wide services. These activities align with the cleanup through FY 2060. RL also has planned for an LTS period that runs from FY 2060 through FY 2090 as part of Mission Support.

Figure 2-1 shows River Corridor Cleanup complete by FY 2024, Final Reactor Disposition complete by FY 2068, Tank Waste Cleanup complete by FY 2050, and Central Plateau Cleanup complete by FY 2065 (including schedule uncertainty).

Figure 2-1. Hanford Site Remaining Cleanup Schedule

Scale dates represent start of fiscal year

Table 2-2. Hanford Site Remaining Cleanup Cost Estimates by PBS.

Project Work Scope	Estimated Cleanup Costs ¹ (Billion \$)
RL Total Remaining Estimated Costs	\$48.8 - \$53.6
NM Stabilization and Disposition – PFP (PBS RL-0011)	\$0.4 - \$0.6
SNF Stabilization and Disposition (PBS RL-0012)	\$0.5
Solid Waste Stabilization and Disposition - 200 Area (PBS RL-0013C)	\$7.5 - \$7.8
Safeguards and Security (PBS RL-0020)	\$3.6
Soil and Water Remediation - Groundwater/Vadose Zone (PBS RL-0030)	\$8.4 - \$8.9
Nuclear Facility D&D - Remainder of Hanford (PBS RL-0040)	\$14.3 - \$18.0
Infrastructure and Services (PBS RL-0040)	\$3.9 - \$4.0
Nuclear Facility D&D - River Corridor Closure Project (PBS RL-0041)	\$1.4
Nuclear Facility D&D - Fast Flux Test Facility Project (PBS RL-0042)	\$0.9 - \$1.0
Richland Community and Regulatory Support (PBS RL-0100)	\$1.2
Long-Term Stewardship (PBS RL-LTS)	\$4.8
Final Reactor Disposition	\$1.9
ORP Total Remaining Estimated Costs	\$56.6
Radioactive Liquid Tank Waste Stabilization and Disposition (PBS ORP-0014)	\$54.4
Major Construction – Waste Treatment Plant (PBS ORP-0060)	\$2.2
Total Remaining Estimated Costs	\$105.4 - \$110.2
NOTE: The remaining estimated cleanup cost does not include the upper bound cost estimates prepared for selected future cleanup actions. These are summarized in Appendix B, Table B-5.	
¹ Cost ranges have been shown in this table to reflect cost and schedule uncertainty; the higher number is used throughout this report. Values are rounded.	
D&D = decontamination and decommission.	PBS = project baseline summary.
LTS = long-term stewardship.	PFP = Plutonium Finishing Plant.
NM = nuclear materials.	RL = U.S. Department of Energy, Richland Operations Office.
ORP = U.S. Department of Energy, Office of River Protection.	SNF = spent nuclear fuel.

SECTION 3 - RIVER CORRIDOR CLEANUP

The River Corridor, the area of the Hanford Site along the Columbia River, includes four production and operations areas:

- **100 Area** – Location of nine former production reactors, associated support facilities, and related waste sites.
- **300 Area** – Location of research and development, fuel fabrication facilities, and related waste sites.
- **400 Area** – Buildings and waste sites other than operating facilities, Fuels and Materials Examination Facility, and the Fast Flux Test Facility (FFTF).
- **600 Area** – Location of two major burial grounds (618-10 and -11) with some additional soil and debris sites.

The majority of the River Corridor Cleanup is on track for completion by FY 2020. Final remedial activities (excluding final reactor disposition) may extend until FY 2024. DOE manages the River Corridor Cleanup through two projects that are planned and funded under separate PBSs:

1. Nuclear Facility D&D – River Corridor Closure Project (PBS RL-0041) addresses cleanup of waste sites, burial grounds, and facilities in the 100, 300, 400, and 600 Areas and the interim safe storage (ISS) of the C, D, DR, F, H, KE, KW, and N Reactors. This project is currently responsible for operating and maintaining the Environmental Restoration Disposal Facility (ERDF) located on the Central Plateau, which is the disposal location for the remediation waste from the River Corridor and other Hanford cleanup operations. Section 3.1 discusses the scope of this project.
2. SNF Stabilization and Disposition (PBS RL-0012) addresses removal of fuel and sludge from the K Basins. The 105-KW Basin deactivation and removal work scope has been transferred to PBS RL-0041. Section 3.2 discusses the scope of this project.

Although currently not considered to be a project, Final Reactor Disposition will address cleanup of the 100 Area surplus production reactors. Section 3.3 discusses the scope of this activity.

Groundwater cleanup is ongoing in the River Corridor. RL manages the groundwater cleanup through Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), which covers groundwater remediation for the entire Hanford Site. Groundwater associated with the River Corridor is discussed in the Central Plateau Cleanup in Section 4.2.

Cleanup is performed in accordance with interim and final RODs and action memoranda as listed in Appendix A and with key TPA milestones listed in Table 3-1. These TPA milestones provide the structure that the Tri-Party agencies have agreed to for Hanford priorities and scope sequencing.

Milestone	Title	Compliance Date
Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041)		
M-016-00A	Complete all response actions for the 100 Areas, excluding K Area.	03/31/2017
M-016-00B	Complete all interim 300 Area remedial actions.	09/30/2018
M-016-00C	Complete all response actions for the 100-K Area.	12/31/2020
M-016-69	Complete all interim 300 Area remedial actions (300-FF-2 OU waste sites).	09/30/2015
M-016-143	Complete the interim response actions for the 100-K Area within the perimeter boundary and to the river for Phase 2 actions.	12/31/2015
M-089-00	Complete closure of mixed waste units in 324 Building Cells B and D.	TBD
M-093-00	Complete final disposal of 100 Areas surplus production reactor buildings.	TBD
M-093-27	Complete 105-KE and KW Reactor ISS.	12/31/2019
M-094-00	Complete disposition of 300 Area surplus facilities.	09/30/2018
M-016-178	Initiate Deactivation of 105-KW Fuel Storage Basin.	12/31/2015
M-016-181	Complete Deactivation, Demolition and Removal of 105-KW Fuel Storage Basin.	09/30/2019
M-016-186	Initiate Soil Remediation Under 105-KW Fuel Storage Basin.	12/31/2019
SNF Stabilization and Disposition (PBS RL-0012)		
M-016-173	Select K Basin sludge treatment and packaging technology and propose new interim sludge treatment and packaging milestones.	03/31/2015
M-016-176	Complete sludge removal from 105-KW Fuel Storage Basin.	12/31/2015
D&D	= decontamination and decommissioning.	
ISS	= interim safe storage.	
	OU = operable unit. PBS = project baseline summary. TBD = to be determined.	

The Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041) will clean up the areas of Hanford located in the Columbia River Corridor in accordance with existing RODs (see Appendix A). Anticipated land uses for the River Corridor are described in DOE/EIS-0222-F and in the subsequent ROD. The River Corridor Closure Project established the following cleanup objectives:

- Remediate waste sites.
- Deactivation, decontamination, decommission, and demolition (D4) of facilities.
- Place eight plutonium production reactors into ISS. Figure 3-1 and Figure 3-2 depict C Reactor before and after the ISS process. Table 3-2 provides the status of the reactors. Note B Reactor's status as part of the newly established Manhattan Project National Historical Park.
- Operate ERDF to support disposal of waste generated during D4, field remediation, ISS, and support to other Hanford waste generators.
- Complete substantive remediation to allow the 100 and 300 Areas to be deleted from the National Priorities List.
- The River Corridor Closure Project includes remediation of the 600 Area burial sites 618-10 and 618-11.



Figure 3-1. C Reactor Before Interim Safe Storage.



Figure 3-1. C Reactor After Interim Safe Storage.

Table 3-2. Reactor Status.

Reactor	Status	Remaining Activity
B	Named National Historic Landmark by U.S. Department of Interior in 2008. Reactor open for escorted public tours.	On December 19, 2014, the Manhattan Project National Historical Park was authorized, which includes B Reactor as the world's first production reactor.
C	Reactor placed in ISS.	Final disposition of reactor block.
D	Reactor placed in ISS.	Final disposition of reactor block.
DR	Reactor placed in ISS.	Final disposition of reactor block.
F	Reactor placed in ISS.	Final disposition of reactor block.
H	Reactor placed in ISS.	Final disposition of reactor block.
KE	Fuel storage basin demolished; continued deactivation, decommissioning, and demolition activities in preparation for emplacement of safe storage enclosure.	Reactor ISS began in 2011 and is scheduled for completion by 2019; final disposition of reactor block.
KW	Awaiting sludge removal to proceed with demolition of adjacent buildings and installation of safe storage enclosure to complete ISS activities.	ISS is scheduled for completion by 2019; final disposition of reactor block.
N	Reactor placed in ISS.	Final end state of the reactor has not been determined.
ISS = interim safe storage.		

Table 3-3 summarizes the scope for the Level 2 work elements.

Table 3-3. Nuclear Facility D&D-River Corridor Closure Project (PBS RL-0041) Level 2 Scope. (2 pages)

Work Element	Scope Description
Waste Operations	Includes the transportation, disposal, and treatment (if required) of waste from the River Corridor Cleanup activities, as well as from other Hanford cleanup operators. Waste operations will expand and operate the ERDF, and transition the ERDF to a successor operator at the end of the Nuclear Facility D&D–River Corridor Closure Project.
End State/Final Closure	Includes preparing an integrated River Corridor work plan for a CERCLA baseline risk assessment; preparing a baseline risk assessment for 100 and 300 Areas; conducting a risk evaluation for River Corridor areas outside 100 and 300 Areas; conducting orphan site evaluations; conducting surface soil surveys; preparing remedial action reports that document completion of interim remedial actions for each geographic area; conducting closure reviews; preparing a remedial investigation/feasibility study and proposed plan for six River Corridor source and groundwater areas; and preparing transition and turnover packages for the six geographic areas for transition to Hanford Long-Term Stewardship.

Work Element	Scope Description
Mission Support/ General Support	Includes functional support and business operations necessary to achieve River Corridor Closure and field project objectives, providing trained and qualified staff, performance standards, facilities services, and office supplies. General support functions include safety, health and quality, regulatory and environmental management, project integration, project services, engineering services, and Office of the Project General Manager.
Plateau Remediation Contract River Zone Environmental	Includes work remaining to complete 100-K Area remediation, demolition of K East Basin, disposition of K East and K West Reactors, and D4 of support structures. In K West Basin, near-term deactivation includes removal of containerized sludge and any found scrap/scrap fuel, and finally removal of the fuel basin.
Site Infrastructure & Utility/Logistics & Transportation (B Reactor)	Includes management and oversight for B Reactor facility activities, including planning, directing, and providing technical support to maintain, upgrade, and preserve the B Reactor facility in a safe condition. After PBS RL-0041 ends, this scope will transfer to PBS RL-0040.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.2 for details. <ul style="list-style-type: none"> Includes administrative and technical support, service assessment pool, and other activities. Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. Includes contractor's fee, pension, management reserve and Government & Administrative allocations.
CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601.</i>
D4 =	deactivation, decontamination, decommission, and demolition.
D&D =	decontamination and decommission.
ERDF =	Environmental Restoration Disposal Facility.
PBS =	project baseline summary.
ROD =	record of decision.
RTD =	remove, treat, and dispose.
RL =	U.S. Department of Energy, Richland Operations Office.

Section 3.2 - SNF Stabilization and Disposition (PBS RL-0012)

The SNF Stabilization and Disposition Project (PBS RL-0012) provides for safe stabilization, packaging, and interim storage of SNF sludge. After removing the sludge, the 105-KW Basin deactivation and removal work scope will be performed under PBS RL-0041. At the completion of this project, significant hazards to workers, the public, and the environment will have been eliminated. Major cleanup objectives for the SNF Stabilization and Disposition Project are:

- All SNF will be removed from K Basins and repackaged, dried, and transported to interim storage at the Canister Storage Building (CSB).
- Sludge material from K Basin knock-out pots will be pretreated, packaged, dried, and transported to interim storage at the CSB pending disposal at a future repository. Once stabilized and placed into storage, this waste stream and the remaining sludge will be transferred to another project (PBS RL-0013C, Solid Waste Stabilization and Disposition–200 Area; see Table 4-6 Sludge Disposition) for final disposition to the Waste Isolation Pilot Plant (WIPP) in New Mexico or other disposal facility.
- The remaining sludge will be retrieved and shipped to an interim onsite storage facility (T Plant), then treated and packaged for shipment to an offsite disposal facility.
- Debris within the 105-KW Basin will be packaged and transported for disposal. Additional scope information on these work elements is provided in Table 3-4.

Table 3-4. SNF Stabilization and Disposition (PBS RL-0012) Level 2 Scope Summary.

Work Element	Scope Description
Program Management	Provides project management for 100-K Area work activities.
K Basins Operations and Maintenance	Includes dose data gathering and analysis; sampling and characterization of radioactive and hazardous waste to maintain compliance in 105-KW Basin (note that 105-KE Basin has been demolished); basic plant maintenance; and general duties and operations to keep 105-KW Basin and the Cold Vacuum Drying Facility in a safe and compliant condition.
Facility Operations	Includes auxiliary operations support, conduct of operations support, waste management support, and sample management support. Specific tasks include, but are not limited to, operational and environmental sampling, operation of potable and service water supplies, and conduct of operations.
Sludge Treatment Project	Includes the design, procurement, fabrication, installation, testing, startup, operation, deactivation, and decontamination of the equipment necessary to perform the functions to remove consolidated containerized sludge, then stabilize and package the sludge for interim storage at Hanford. Once stabilized and placed into storage, the waste stream will be transferred to another project area (PBS RL-0013C, Solid Waste Stabilization and Disposition–200 Area) for final disposition to WIPP or other disposal facilities.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site-wide services and infrastructure. See Section 6.2 for details. <ul style="list-style-type: none"> - Includes administrative and technical support and other activities. - Includes services that are charged based on predetermined rates and services that are directly charged to Other Hanford Contractors. - Includes contractor's fee and management reserve.
PBS = project baseline summary. RL = U.S. Department of Energy, Richland Operations Office.	SNF = special nuclear fuel. WIPP = Waste Isolation Pilot Plant.

Section 3.3 - Final Reactor Disposition

Final Reactor Disposition will address cleanup of the 100 Area surplus production reactors in accordance with TPA M-093-00. Disposition of the 100 Area reactors (except for B Reactor which is part of the newly established Manhattan Project National Historical Park) was one of the cost estimate alternative analyses evaluated in the 2011 LCR ([DOE/RL-2010-25](#)). See summary in Appendix B, Table B-5, River Corridor - Disposition 100 Area Reactors.

Six reactors (C, D, DR, F, H, and N) have been placed in ISS configuration (see Table 3-2). KE Reactor has completed interim ISS and is in a minimum safe state; KE Reactor and KW Reactor are scheduled to complete ISS by FY 2019. After being placed in ISS, the reactors will undergo surveillance, monitoring, and maintenance for up to 75 years to allow radionuclides to decay. Following this period, the reactor blocks will be removed from their current locations and transported to the Central Plateau Inner Area for disposal.

The 2011 LCR identified the most plausible alternative for the reactors as safe storage followed by deferred one-piece removal. This alternative was developed and evaluated in a final environmental impact statement (EIS) ([DOE/EIS-0119F](#), *Final Environmental Impact Statement Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*) and in a subsequent engineering evaluation ([DOE/RL-2005-45](#), *Surplus Reactor Final Disposition Engineering Evaluation*). DOE issued [58 FR 48509](#), "Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington," in September 1993, which implements the recommendation for safe storage followed by deferred one-piece removal of the surplus reactors. N Reactor was not included in the EIS because it was not available for

decommissioning at the time of the *National Environmental Policy Act of 1969* (NEPA) EIS and ISS was approved through the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) process. Final disposition of N Reactor will be determined by a subsequent NEPA or CERCLA decision process. In the planning case presented in this report, N Reactor is assumed to undergo safe storage followed by deferred one-piece removal.

Section 3.4 - River Corridor Cleanup Assumptions and Uncertainties

In planning for the Hanford Site lifecycle, there are uncertainties that are analyzed to estimate potential scope, schedule and cost changes. The following assumptions were identified for Nuclear Facility D&D – River Corridor Closure Project (PBS RL-0041) work scope:

- Regulatory changes will not require additional activities (e.g., document revisions, additional sampling) that would significantly impact costs or schedules.
- Pacific Northwest National Laboratory (PNNL) operating facilities will need to be available to support Office of Science missions. After PBS RL-0041 is completed, the facility D&D/waste site cleanup work will transfer to PBS RL-0040 Nuclear Facility D&D – Remainder of Hanford.
- The Natural Resource Damage Assessment and Restoration (NRDAR) and risk assessment litigation brought by the Yakama Nation will not significantly affect cost or schedule.
- The Hanford Natural Resource Trustee Council activities, including studies and NRDAR process will not significantly affect cost or schedule.

For SNF Stabilization and Disposition (PBS RL-0012), the following assumptions were identified:

- Compliance with regulatory standards and requirements will provide an adequate level of protection for the worker, public health, safety, and the environment during operations activities and after D4 is complete.
- ERDF waste acceptance criteria will not change substantially.
- T Plant is acceptable for interim sludge storage and no pretreatment for the sludge is needed before transfer. Subsequent treatment and packaging of the sludge will be performed by the work scope in PBS RL-0013C.

Post-CERCLA ROD treatability studies and focused feasibility studies will not affect the sludge treatment process.

SECTION 4 - CENTRAL PLATEAU CLEANUP

The Central Plateau is a 75-square-mile area located near the center of Hanford, which contains about 900 excess facilities, including five massive chemical processing facilities called canyons, and roughly 800 non-tank farm waste sites. The Central Plateau is home to ongoing waste management operations, such as the Mixed Waste Low-Level Burial Grounds, liquid waste facilities, and the Waste Receiving and Processing (WRAP) Facility. Infrastructure services (e.g., power, water, telecommunication lines), either existing or to be constructed, in the Central Plateau are needed to support cleanup. These facilities, waste sites, canyons, and ongoing waste management operations and infrastructure are spread across the Central Plateau.

During site operations, 450 billion gallons of liquid waste were discharged to the ground; most within the Central Plateau (TRAC-0151-VA, *Historical Perspective of Radioactively Contaminated*

Liquid and Solid Wastes Discharged or Buried in the Ground at Hanford). These past releases have created extensive plumes of groundwater contamination that exceed drinking water standards with a combined area of approximately 73 square miles (DOE/RL-2014-32, Hanford Site Groundwater Monitoring Report for 2013). A significant portion of contamination remains in the soil column above the water table and poses a potential threat to groundwater.

Interim and final groundwater treatment is in place for contaminant plumes in the 200 West Area and in several locations in the 100 Areas. The ROD for the large carbon tetrachloride plume in the 200 West Area (200-ZP-1 Operable Unit [OU]) was signed in 2008 (EPA 2008, Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington) and operation of the expanded 200 West Pump-and-Treat Facility began in FY 2012. The ROD for plutonium-contaminated and cesium-contaminated soil sites (200-PW-1/3/6 and 200-CW-5 OUs) was signed in FY 2011 (EPA 2011, Record of Decision Hanford 200 Area Superfund Site 200-CW-5 and 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units) and a new interim action ROD for 200-UP-1 groundwater OU was approved in 2012 (EPA 2012, Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site, 200-UP-1 Operable Unit). The Central Plateau cleanup is organized into the following three principal components (DOE/RL-2009-10):

- **Inner Area** – The footprint of the Central Plateau that will be dedicated to long-term waste management and containment of residual contamination and will remain under Federal ownership and control as long as a potential hazard exists. The Inner Area contains the majority of Hanford’s active waste treatment, storage and disposal facilities, including hundreds of waste sites, surplus facilities, miles of buried pipelines, tank farms, and large canyon facilities. Cleanup of the Inner Area will make this footprint as small as practical.
- **Outer Area** – All areas of the Central Plateau beyond the boundary of the Inner Area. It is DOE’s intent to clean up the Outer Area to a level comparable to the River Corridor (i.e., suitable for unrestricted surface use under continued Federal ownership and control and consistent with DOE’s anticipated future land use of conservation/mining). Contaminated soil and debris removed as part of Outer Area cleanup will be placed within the Inner Area for final disposal. Completion of cleanup for the approximately 65-square-mile Outer Area will shrink the active footprint of cleanup for the Central Plateau to the Inner Area.
- **Groundwater and Deep Vadose Zone Remediation** – DOE’s goal is to restore groundwater to its beneficial uses (Table 1-2, Goal 2), unless restoration is determined to be technically impracticable. An important element of groundwater protection and remediation is to develop and implement ways to protect groundwater from continuing influx of contaminants from the deep vadose zone.

The cleanup work scope in the Central Plateau is managed through four projects:

- Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030 (entire Hanford Site, including Inner and Outer Areas and the River Corridor).
- Nuclear Facility D&D – Remainder of Hanford, PBS RL-0040 (geographical cleanup of waste sites and facilities, including the remaining canyon facilities in the Inner and Outer Areas).
- Nuclear Facility D&D – Fast Flux Test Facility Project, PBS RL-0042 (includes FFTF located in River Corridor).
- Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C (Inner Area).

Cleanup is being performed in accordance with RODs and action memoranda as listed in Appendix A and with key TPA milestones listed in Table 4-1.

Table 4-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)

Milestone	Description	Compliance Date
NM Stabilization and Disposition–PFP, PBS RL-0011		
M-083-44	Complete transition of the 234-5Z (Plutonium Conversion Facility) and ZA (Plutonium Conversion Support Facility), 243-Z Low-Level Waste Treatment Facility, 291-Z Exhaust Building, and 291-Z-1 Exhaust Stack to support PFP decommissioning.	09/30/2015
M-083-00A	Complete PFP facility transition and selected disposition activities.	09/30/2016
Nuclear Facility D&D–Remainder of Hanford, PBS RL-0040		
M-016-00	Complete remedial actions for all non-tank farm and non-canyon OUs.	09/30/2024
M-016-200A	Complete U Plant Canyon (221-U Facility) demolition in accordance with the remedial design/remedial action work plan.	09/30/2017
M-016-200B	Complete U Plant Canyon (221-U Facility) barrier construction in accordance with the remedial design/remedial action work plan.	09/30/2021
M-037-10	Complete unit-specific closure requirements according to the closure plan(s) for seven (7) TSD units: 207-A South Retention Basin, 216-A-29 Ditch, 216-A-36B Crib, 216-A-37-1 Crib, 216-B-63 Trench, Hexone Storage and Treatment Facility (276-S-141/142), and 241-CX Tank System (241-CX-70/71/72).	09/30/2020
M-037-11	Complete unit-specific closure requirements for two (2) TSD units: 216-B-3 Main Pond system and 216-S-10 Pond and Ditch.	09/30/2016
M-085-00	Complete response actions for the canyon facilities/associated past practice waste sites, other Tier 1 Central Plateau facilities not covered by existing milestones, and Tier 2 Central Plateau facilities. This includes B Plant, PUREX, and REDOX canyons and associated past practice waste sites in 200-CB-1, 200-CP-1, and 200-CR-1 OUs.	TBD
M-085-01	Submit a change package to establish a date for major milestone M-085-00.	09/30/2022
Solid Waste Stabilization and Disposition–200 Area, PBS RL-0013C		
M-091-00	Complete the treatment to LDR treatment standards for all Hanford Site RCRA MLLW and RCRA TRUM waste. DOE may choose to complete certification and shipment of TRUM waste for disposal at the WIPP in lieu of LDR treatment if, as of the time of shipment, such waste is exempt from LDR treatment standards when disposed at WIPP.	Date to be established pursuant to M-091-44T
M-091-01	Complete the acquisition of new facilities, modification of existing facilities, and modification of planned facilities necessary for retrieval, storage, and treatment/processing of all Hanford Site RCRA TRUM waste.	Date to be established pursuant to M-091-01A and M-091-01B

Table 4-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)

Milestone	Description	Compliance Date
M-091-01A	Complete the conceptual design for acquisition of capabilities and/or acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for retrieval, designation, storage, and treatment/processing prior to disposal of all Hanford Site RH TRUM waste and TRUM waste in large containers (in aboveground storage as of June 30, 2009 and in retrievable storage). In addition, submit a milestone change package (based on the conceptual design) for annual construction milestones for the planned facilities necessary for retrieval, storage, and treatment/processing of all Hanford Site RH TRUM waste and large container CH TRUM waste.	09/30/2016
M-091-01B	Complete the definitive design for acquisition of capabilities and/or acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for retrieval, designation, storage, and treatment/processing prior to disposal of all Hanford Site RH TRUM waste and TRUM waste in large containers (in aboveground storage as of June 30, 2009 and in retrievable storage). In addition, submit a milestone change package documenting any substantial variations, based on the definitive design, from annual construction milestones finalized pursuant to M-091-01A.	09/30/2018
M-091-40	Complete the retrieval and designation of CH retrievably stored waste in burial grounds 218-W-4B, 218-W-3A, and 218-E-12B.	09/30/2016
M-091-41	Complete retrieval and designation of RH retrievably stored waste (regardless of package size, including the 200 Area caissons).	12/31/2018
M-091-41A	Complete retrieval of non-caisson RH, retrievably stored waste.	09/30/2016
M-091-42	Complete the treatment of small container CH MLLW (in aboveground storage as of June 30, 2009 and in retrievable storage) to meet applicable LDR treatment standards in compliance with WAC 173-303-140.	09/30/2017
M-091-43	Complete the treatment of large container CH MLLW and RH MLLW (in aboveground storage as of June 30, 2009 and in retrievable storage) to applicable LDR treatment standards in compliance with WAC 173-303-140.	09/30/2017
M-091-44	Complete the treatment of large container CH TRUM waste and RH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage).	12/31/2030
M-091-44T	Submit a change package for annual milestones to treat or certify and ship large container CH TRUM waste and RH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage) to complete the disposition of this waste.	09/30/2018
M-091-46	Complete the certification of small container CH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage).	09/30/2017
M-091-46H	Complete offsite shipment of all small container CH TRUM waste (in aboveground storage as of June 30, 2009 and in retrievable storage).	09/30/2018
M-092-05	Determine disposition path and establish interim agreement milestones for Hanford Site cesium/strontium capsules.	06/30/2017
Soil and Water Remediation—Groundwater/Vadose Zone, PBS RL-0030		
M-015-00	Complete the RI/FS (or RCRA facility investigation/corrective measures study and RI/FS) process for all non-tank farm OUs except for canyon/associated past practice waste site OUs covered in M-085-00.	12/31/2016
M-015-21A	Submit a 200-BP-5 and 200-PO-1 OU feasibility study report and proposed plan(s) to Ecology.	06/30/2015
M-015-38B	Submit a revised feasibility study report and revised proposed plan(s) for the 200-CW-1, 200-CW-3, and 200-OA-1 OUs for waste sites in the Outer Area of the Central Plateau to EPA.	10/30/2015

Table 4-1. Central Plateau Cleanup Key Tri-Party Agreement Milestones. (3 pages)

Milestone	Description	Compliance Date
M-015-91B	Submit feasibility study report(s) and proposed plan(s) for the 200-BC-1/200-WA-1 OUs (200 West Inner Area) to EPA.	12/31/2015
M-015-92B	Submit corrective measures study and feasibility study report(s) and proposed corrective action decision(s)/proposed plan(s) for the 200-EA-1 and 200-IS-1 OUs (Central Plateau 200 East Inner Area) to Ecology.	12/31/2016
M-015-93B	Submit RCRA facility investigation/corrective measures study and RI/FS report and proposed corrective action decision/proposed plan for the 200-SW-2 OU to Ecology.	12/31/2016
M-015-110B	Submit corrective measures study and feasibility study report and proposed plan/proposed corrective action decision for the 200-DV-1 OU to Ecology.	09/30/2015
M-024-000	Complete required well installations in accordance with the RCRA and CERCLA groundwater requirements.	TBD
<p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.</i> <i>Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.</i> <u>WAC 173-303-140</u>, "Land Disposal Restrictions," <i>Washington Administrative Code</i>, Olympia, Washington.</p> <p>CERCLA= <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i> PBS = project baseline summary. CH = contact-handled. PFP = Plutonium Finishing Plant. D&D = decontamination and decommissioning. PUREX = Plutonium Uranium Extraction (Plant). Ecology = Washington State Department of Ecology. RCRA = <i>Resource Conservation and Recovery Act.</i> EPA = U.S. Environmental Protection Agency. REDOX = Reduction-Oxidation Facility (S Plant). LDR = Land Disposal Restrictions. RH = remote-handled. MLLW = mixed low-level waste. RI/FS = remedial investigation/feasibility study. NM = nuclear material. TBD = to be determined. OU = operable unit. TRUM = transuranic mixed (waste). TSD = treatment, storage, and disposal. WIPP = Waste Isolation Pilot Plant.</p>		

Section 4.1 - Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030)

Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), also known as the Groundwater Project, includes the following:

- Regulatory decision-making process for all groundwater OUs on the Hanford Site.
- Remediation of all groundwater on the Hanford Site in accordance with the groundwater OU decisions.
- Regulatory decision-making process for Central Plateau waste sites (remediation of waste sites is part of the Nuclear Facility D&D – Remainder of Hanford [PBS RL-0040] project scope).
- Regulatory decision-making process and remediation for soil contamination in the Central Plateau deep vadose zone.

The project includes soil and groundwater characterization, groundwater monitoring, groundwater treatment, well drilling, treatability testing, evaluation of remediation options, and preparing the regulatory documentation necessary to obtain final RODs on remedial actions for soil waste sites and groundwater, including the River Corridor and Central Plateau.

Much of the contamination remains in the vadose zone soil column above the water table; however, at waste sites where large volumes of liquid were released, the more mobile contaminants have reached groundwater. The tritium groundwater contaminant plume from the Central Plateau has reached the Columbia River. Additional groundwater contaminant plumes such as chromium,

strontium-90, and uranium originating in the 100 or 300 Areas also have reached the Columbia River.

The major chemical contaminants present in the groundwater include carbon tetrachloride, hexavalent chromium, cyanide, nitrate, and trichloroethene. Major radioactive contaminants include iodine-129, strontium-90, technetium-99, tritium, and uranium. Other groundwater contaminants that exceed drinking water standards in several Hanford Site areas, but are of limited extent, include a volatile organic compound (cis-1,2-dichloroethene) and radioactive contaminants (carbon-14, cesium-137, gross beta and plutonium-239/240) (DOE/RL-2014-32). The Groundwater Project (DOE/RL-2002-59, *Hanford Site Groundwater Strategy Protection, Monitoring, and Remediation*) has three major objectives:

- Take actions necessary to prevent degradation of the groundwater
- Remediate groundwater to restore it to beneficial use where practicable and protect the river
- Monitor groundwater to identify emerging problems and guide the remediation process.

To be successful, the Groundwater Project needs to obtain sufficient characterization data, evaluate performance of early actions, and develop remedial action objectives. Hanford is divided into ten groundwater OUs; six in the River Corridor (100-BC-5, 100-KR-4, 100-NR-2, 100-HR-3, 100-FR-3, 300-FF-5) and four in the Central Plateau (200-ZP-1, 200-UP-1, 200-BP-5, 200-PO-1).

Groundwater monitoring activities are also required by the *Atomic Energy Act*, CERCLA, and the *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste* (WA7890008967).

Table 4-3 provides additional details on the scope of work for each of the work elements.

Table 4-3. Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030) Level 2 Scope Summary. (2 pages)

Work Element	Scope Description
Integration and Assessments	Includes eight elements: Strategic Integration; Technical Integration; Remediation Decision Support; Remediation Science and Technology; Sample Management and Reporting; Environmental Databases; Value Engineering Studies; and Systematic Planning Integration. This integration function coordinates and focuses Hanford Site characterization and assessment efforts to ensure consistency, eliminate information gaps and overlaps, apply science and technology new to Hanford, foster technical peer review, and integrate remediation decisions.
Drilling	Includes planning, coordinating, and implementing well drilling and well decommissioning for Hanford wells according to project-specific requirements. This includes drilling wells to Washington State standards and preparing all required submittals and notifications required by Washington State law and providing well-related information for Hanford databases. Aspects of drilling include technical coordination, procurement, labor, subcontracts, materials, and equipment for project planning; documentation; field support during drilling; and project closeout to support drilling wells for groundwater monitoring and optimization of groundwater treatment systems.
Project Management	Includes program management oversight; business management and integration; project control and integration; engineering and maintenance; environmental, safety, health and quality; and technical support.
Integrated Field Work	Includes services, infrastructure, material, equipment, labor, and contracts used to plan, support, and perform field work. It includes non-OU related well maintenance, monitoring, and reporting. Major elements include operations and maintenance, training, field equipment purchases, unanticipated field work, and maintenance, monitoring, and reporting for wells that are not aligned with a specific OU.

Work Element	Scope Description
Groundwater Monitoring & Performance Assessments	<p>Includes:</p> <ul style="list-style-type: none"> • Operation, maintenance, sampling, and dismantlement of the Modutanks that are used for disposal of groundwater from onsite well sampling and maintenance, characterization, and remediation activities. • Groundwater sampling, analysis, monitoring, evaluation, assessment, and reporting for RCRA TSDs, CERCLA OUs, and other permitted facilities and sites. • Coordination and management of groundwater sampling and water level determinations. • Operation, maintenance, and relocation of the Hanford Geotechnical Sample Library, the repository for historical sediment, core, and other soil and sediment samples used for scientific studies including laboratory studies, bench tests, conceptual model development, and fate and transport evaluations for contaminant migration. • Project management for these activities. • Well maintenance, monitoring, and reporting. • Geophysical sciences and borehole logging.
Groundwater OUs Decision Documents & Remediation	<p>Includes management and implementation of groundwater remediation for Hanford, including:</p> <ul style="list-style-type: none"> • Implementing the RI/FS process for groundwater OUs by performing RI/FSs leading to final RODs. • Preparing DQO reports, sampling and analysis plans, waste management plans, and other regulatory documentation, as needed, for all groundwater OUs. • Conducting as needed field studies to support decision making and design. • Designing treatment systems in accordance with RODs and remedial action work plans. • Implementing treatment systems in accordance with the design and the ROD requirements or modifying and expanding the remedy to optimize remediation. • Conducting ongoing monitoring and reporting. • Maintaining system and monitoring wells. • Final D&D of remedy components. <p>The work scope is managed by OU and is consistent between the OUs.</p>
Regulatory Decisions & Closure Integration	<p>Includes planning, management, characterization, documentation, and other associated activities necessary to complete the remedial decision process for each closure zone, including closure plans for RCRA TSD sites. Specific activities include RI/FSs, proposed plans, closure plans, engineering evaluation/cost analyses, DQOs, sampling and analysis plans, RODs, and other documents and activities leading to remedial decisions and remediation planning. Following completion of assessment activities through decision documentation (e.g., ROD or closure plan), completion of the remedial design/remedial action work plan and waste site/facility remediation and/or closure will be addressed under Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040).</p>
Deep Vadose Zone Treatability Tests	<p>This involves deep vadose zone treatability testing in accordance with <u>DOE/RL-2007-56</u>, conducting engineering and technical studies necessary to support decision-making for Central Plateau remediation of the deep vadose zone OU, and evaluating tradeoffs associated with remedial action decisions. The initial work phase focuses on conducting laboratory work and numerical modeling to address uncertainties associated with the technology and employing the technology in the deep vadose zone. The second phase involves the design and implementation of treatability testing in the field at carefully selected locations, using one or more technologies - depending on the success of the initial testing.</p>
Deep Vadose Zone OU	<p>Addresses mitigation of the contamination present in the deep vadose zone at Hanford. Initial actions planned for this OU are field studies and deployment activities and developing decision documents. Other tasks for this OU, such as remedial action planning and implementation; well support activities; monitoring and reporting support; OU modifications and expansions; and final D&D of the OU remediation activities at the conclusion of the project will be included following the decision process. Changes to the TPA have been undertaken to add milestones for testing remedial technologies and to establish a new deep vadose zone OU (200-DV-1). Also, DOE is establishing a project team to focus on the development and evaluation of deep vadose zone remedies. DOE is also establishing the Deep Vadose Zone Applied Field Research Center at Hanford, which would be the focal point for investigation and resolution of critical deep vadose zone issues at Hanford and within the DOE complex.</p>

Work Element	Scope Description																								
Site-wide Services and Other Distributed Costs	<p>Includes proportional share of costs for site services and infrastructure. See Section 6.2 for details.</p> <ul style="list-style-type: none">- Includes administrative and technical support provided to the project.- Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors.- Includes contractor’s fee and management reserve, allocated pensions and General and Administrative.																								
<p><i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601.</i></p> <p><i>DOE/RL-2007-56, 2008, Deep Vadose Zone Treatability Test Plan for the Hanford Central Plateau, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.</i></p> <p><i>Resource Conservation and Recovery Act of 1976, 42 USC 6901.</i></p> <table><tr><td>CERCLA =</td><td><i>Comprehensive Environmental Response, Compensation, and Liability Act.</i></td><td>RCRA =</td><td><i>Resource Conservation and Recovery Act.</i></td></tr><tr><td>D&D =</td><td>decontamination and decommission.</td><td>RI/FS =</td><td>remedial investigation/feasibility study.</td></tr><tr><td>DOE =</td><td>U.S. Department of Energy.</td><td>RL =</td><td>Richland Operations Office.</td></tr><tr><td>DQO =</td><td>data quality objectives.</td><td>ROD =</td><td>record of decision.</td></tr><tr><td>OU =</td><td>operable unit.</td><td>TPA =</td><td>Tri-Party Agreement.</td></tr><tr><td>PBS =</td><td>project baseline summary.</td><td>TSD =</td><td>treatment, storage, and disposal.</td></tr></table>		CERCLA =	<i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	RCRA =	<i>Resource Conservation and Recovery Act.</i>	D&D =	decontamination and decommission.	RI/FS =	remedial investigation/feasibility study.	DOE =	U.S. Department of Energy.	RL =	Richland Operations Office.	DQO =	data quality objectives.	ROD =	record of decision.	OU =	operable unit.	TPA =	Tri-Party Agreement.	PBS =	project baseline summary.	TSD =	treatment, storage, and disposal.
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Section 4.2 - Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040)

Nuclear Facility D&D – Remainder of Hanford (PBS RL-0040) is the geographically based cleanup and closure of the Central Plateau and remaining scope in the other Hanford Site areas. In addition to the Central Plateau cleanup scope, PBS RL-0040 includes the infrastructure and services scope under Mission Support, which is discussed in Section 6. This section focuses on the cleanup-related elements of the PBS, also known (and referred to in the rest of this section) as the Central Plateau Remediation Project (PBS RL-0040). The Central Plateau Remediation Project scope includes the demolition and remediation scope that is organized into 21 geographical areas referred to as closure zones.

Following completion of assessment activities through decision documentation (e.g., ROD or closure plan) under Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), completion of the remedial design/remedial action work plan and waste site/facility remediation and/or closure will be addressed under the Central Plateau Remediation Project (PBS RL-0040). The Central Plateau Remediation Project scope includes implementing the decisions through the physical cleanup of canyon facilities, buildings and structures, waste sites, pipelines, and miscellaneous sites (e.g., debris piles), and utilities to ensure appropriate protection has been provided for the cleanup.

To accomplish the Central Plateau Remediation Project (PBS RL-0040), the following major objectives have been established:

- Perform safe S&M of facilities and waste sites pending remediation
- Integrate planning and execution activities with other Central Plateau projects
- Remediate waste sites
- Decontamination and decommission (D&D) canyons
- D&D excess facilities.

The project will be complete when the following endpoint criteria have been reached:

- Canyons and surplus facilities removed or dispositioned and ready for transition to LTS

- Central Plateau waste sites remediated in accordance with approved decisions
- Legacy wastes and 300 Area PNNL facilities have cleanup decisions
- Institutional controls implemented
- Post-remediation operations and maintenance requirements implemented.

The work scope for the Central Plateau Remediation Project (PBS RL-0040) is organized into three primary Level 2 work elements. Table 4-4 provides additional details on the scope of work for each of these work elements.

The duration, in part, is dependent on transition of the tank farms to the project for final disposition after closure activities are completed by ORP. It is also dependent on transition of waste management facilities that are no longer needed to support Hanford cleanup from Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) to the project for final disposition (see Section 4.4).

Table 4-4. Central Plateau Remediation Project (PBS RL-0040) Level 2 Scope Summary.

Work Element	Scope Description
Regulatory Decisions and Closure Integration	Includes general management direction and technical/environment, safety, health, and quality support, engineering and technical studies necessary to support decision making for Central Plateau remediation and to evaluate tradeoffs associated with remedial action and facility disposition decisions, regulatory decisions for canyons and related nuclear process facilities, regulatory decisions for below-slab remediation for non-canyon facilities, hazard reduction and emergency response tasks necessary to address aging facility or waste site conditions that are above and beyond anticipated operational and maintenance plans.
Zone Environmental Remediation	Includes geographic remediation of closure zones in the Central Plateau. Each zone has a variety of cleanup features that can include waste sites, facilities, canyons, pipelines, and remedial barriers. Actions to be taken for cleaning up each waste site, including pipelines, will be determined through the regulatory decision processes (under Soil and Water Remediation–Groundwater/Vadose Zone, PBS RL-0030) and as part of remedial definition activities. Potential remedial actions for waste sites range from monitored natural attenuation to capping or removal, depending on waste site conditions. Contamination levels, risks, proximity to facilities, and other considerations are factored into the selection. Existing structures (other than the canyon facilities) are expected to be demolished and the debris disposed at the Environmental Restoration Disposal Facility.
S&M and Min-Safe for Facilities and Waste Sites	Includes CERCLA 5-year reviews, surveillance and system, structural, equipment, and other maintenance on Central Plateau facilities/buildings and waste sites.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.2 for details: <ul style="list-style-type: none"> • Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. • Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.
CERCLA= <i>Comprehensive Environmental Response, Compensation, Liability Act.</i> PBS = project baseline summary. S&M = surveillance and maintenance.	

Section 4.3 - Nuclear Facility D&D–Fast Flux Test Facility (FFTF) Project (PBS RL-0042)

FFTF is a deactivated, 400-megawatt (thermal) liquid-metal (sodium)-cooled, research and test reactor located in the 400 Area. The facility was used to develop and test advanced fuels and materials for the Liquid Metal Fast Breeder Reactor Program and to serve as a prototype facility for future Liquid Metal Fast Breeder Reactor Program facilities. DOE issued a shutdown order for FFTF in December 1993 because the Liquid Breeder Reactor Program had been cancelled.

The scope of Nuclear Facility D&D – Fast Flux Test Facility Project (PBS RL-0042) is to provide for safe D&D, secure storage and stabilization of hazardous/radioactive materials, interim maintenance of facilities, demolition, and disposal of the waste. The mission requires removing and dispositioning sodium coolant, the reactor containment building, reactor support buildings, and auxiliary facilities and support systems. The project's technical objective will achieve the following:

- Remove and disposition sodium coolant and clean residual sodium
- Fill spaces with grout below 550-foot elevation level (grade level) of the reactor containment building
- Decommission and demolish all facilities.

The regulatory decision for the FFTF containment building final closure, including the de-fueled reactor vessel, will be determined following the appropriate environmental analysis process. For planning purposes, the reactor containment dome is assumed to be removed, the below-grade reactor containment building grouted and entombed, and support facilities and structures demolished to 3 feet below grade and backfilled. The FFTF alternatives have been evaluated in DOE/EIS-0391, Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington and a December 13, 2013, ROD (78 FR 75913).

Waste sites in the 400 Area are included as part of the 300-FF-2 OU, which is being remediated under the Nuclear Facility D&D – River Corridor Closure Project (PBS RL-0041). Table 4-5 summarizes the work scope.

Table 4-5. Nuclear Facility D&D–Fast Flux Test Facility Project (PBS RL-0042) Level 2 Scope Summary.

Work Element	Scope Description
FFTF Cleanup	Includes monitoring, surveillance, and maintenance of FFTF and surrounding area in a safe and compliant manner until D&D; deactivate FFTF; disposition FFTF sodium; construct a sodium reaction facility; decommission FFTF in accordance with a future record of decision; and project management for these activities.
Infrastructure Services	Includes legal support.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.2 for details: <ul style="list-style-type: none"> • Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. • Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.
D&D = decontamination and decommission. PBS = project baseline summary. FFTF = Fast Flux Test Facility. RL = U.S. Department of Energy, Richland Operations Office.	

Section 4.4 - Solid Waste Stabilization and Disposition – 200 Area (PBS RL-0013C)

The scope of the Solid Waste Stabilization and Disposition – 200 Area (PBS RL-0013C) project is to provide waste treatment and disposal services for Hanford facilities and operations. The major mission objectives are to:

- Operate waste treatment facilities, including T Plant, WRAP Facility, and 200 Area Liquid Effluent Treatment Facility (ETF).
- Provide Base Waste Management Operations at the CSB and 200 Area Interim Storage Area, Integrated Disposal Facility (IDF), Waste Encapsulation and Storage Facility (WESF) for cesium/strontium capsule storage, and Low-Level Burial Grounds and mixed waste disposal trenches.

Additional objectives are:

- Retrieve and ship transuranic (TRU) waste for disposal to the WIPP or other permitted facility.
- Develop alternative methods for treatment and disposal of orphan waste. This could include seeking land disposal restrictions variance approvals, expanding commercial treatment facilities permit limits and construction and operation of additional onsite treatment capabilities.
- Obtain processing capabilities to repack large and remote-handled (RH) contaminated waste containers.

The Solid Waste Stabilization and Disposition – 200 Area (PBS RL-0013C) includes completing the following activities:

- Cesium and strontium capsules will be transferred to dry storage and/or permanent disposal.
- Irradiated nuclear fuels will be removed offsite to a national repository for final disposition.
- Stored underground TRU waste will be retrieved and disposed.
- Mixed low-level waste and low-level waste will be treated as necessary and disposed.
- Waste management facilities will be deactivated at the end of their useful lives and will be transferred to Nuclear Facility D&D-Remainder of Hanford (PBS RL-0040) for final disposition.
- Low-Level Burial Grounds (including the mixed waste trenches) will be closed and transferred to Nuclear Facility D&D-Remainder of Hanford (PBS RL-0040) for final disposition and remedial action.
- ERDF will be operated to provide solid waste treatment and disposal services in support of Hanford cleanup after completion of the Nuclear Facility D&D–River Corridor Closure Project (PBS RL-0041).
- IDF will be closed according to the closure plan requirements in the Dangerous Waste Permit (WA7890008967). Closure will follow completion of tank waste vitrification.

Table 4-6 summarizes each scope element. As waste management facilities are no longer needed to support Hanford cleanup, they will be transitioned to Nuclear Facility D&D–Remainder of Hanford (PBS RL-0040) for final disposition.

Table 4-6. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 2 Scope Summary.
(2 pages)

Work Element	Scope Description
Project Management	Provides for the overall project management, coordination, direction, and customer interface to ensure the proper conduct of operation for this project.
Capsule Storage and Disposition	Addresses operation of the WESF pool cells, and includes life extension upgrades to ensure safe and compliant operations, retrieval and disposition of cesium/strontium capsules, and transition of WESF for final D&D.
CSB	Includes safe storage of SNF and immobilized high-level waste from the WTP while awaiting final disposition at the geologic repository, repackaging SNF for shipment, and coordination with the offsite repository for evaluations and information.
MLLW Treatment	Addresses treatment of MLLW to meet regulatory requirements including alternative methods for treatment and disposal of orphan waste. Treatment technologies include macro-encapsulation, stabilization, or thermal techniques such as vacuum desorption. Once categorized, the waste will be prepared for shipment to the appropriate processing or treatment facility.
TRU Retrieval	Consists of the retrieval, designation, and transfer to a TSD facility of both CH and RH solid stored underground TRU waste.
TRU Repackaging	Provides funding for WIPP production, TRU repackaging operations at T Plant and WRAP (or a commercial facility), TRU program support for repackaging, and RH/large packaging capabilities.
WRAP Facility	Provides base and minimum safe operations at the WRAP to support processing of TRU wastes to WIPP and includes transition to final D&D.
T Plant	Addresses the operation and maintenance of the T Plant Complex for waste processing operations, including necessary upgrades and transition to final D&D of the canyon.
CWC	Includes operation and maintenance of the CWC, including upgrades to maintain needed capability and transition to final D&D. The scope includes provision of an alternate capability (other than WRAP) to load CH TRU waste into shipping containers for shipment to WIPP.
ERDF	Addresses the operation of the ERDF after turnover from the River Corridor Closure Project through the end of Hanford cleanup, including cell expansion and ERDF interim cover construction.
IDF	Provides for the preparation, startup, and operation of the IDF to receive and store low-level waste and MLLW in accordance with applicable waste acceptance criteria. The scope includes provisions for IDF expansion.
Solid Waste Base Operations	Provides for the minimum staffing to maintain a viable waste management program and to capture those waste support activities that are essentially fixed cost in nature.
TRU Disposition	Provides funding and resources for the TRU Program's coordination with the Central Characterization Project to certify TRU waste according to the WIPP Waste Acceptance Criteria. This work element also provides funding to perform Hanford WIPP closeout activities, TRU waste characterization activities at the direction or guidance of the Central Characterization Project and to establish shipping capabilities for RH TRU waste and additional CH TRU waste shipping capabilities.
SNF Disposition	Includes design and construction of a Fuel Preparation Facility, turnover of the facility to operations, and level of effort support to the DOE Office of Civilian Radioactive Waste Management and National Spent Nuclear Fuel Program activities.

Table 4-6. Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C) Level 2 Scope Summary.
(2 pages)

Work Element	Scope Description
Mixed Waste Disposal Trenches	Includes operation of the mixed waste disposal trenches and the design, construction, and other activities necessary to add operational layers in the trenches to maintain their ready-to-serve status and to place temporary caps on the trenches.
Sludge Disposition	Includes activities to stabilize and package the sludge from the 105-KW Basin for final disposition to WIPP or other disposal facilities, including Phase 2 treatment and packaging shutdown and deactivation of needed equipment, and management and support.
Site-wide Services and Other Distributed Costs	Includes proportional share of costs for site services and infrastructure. See Section 6.2 for details: - Includes administrative and technical support and other activities. - Includes services that are charged based on predetermined rates, and services that are directly charged to Other Hanford Contractors. - Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.
CH = contact-handled. CSB = Canister Storage Building. CWC = Central Waste Complex. D&D = decontamination and decommission. DOE = U.S. Department of Energy. ERDF = Environmental Restoration Disposal Facility. ETF = Effluent Treatment Facility. IDF = Integrated Disposal Facility. LERF = Liquid Effluent Retention Facility. MLLW = mixed low-level waste. PBS = project baseline summary.	RH = remote-handled. RL = U.S. Department of Energy, Richland Operations Office. SNF = spent nuclear fuel. TEDF = Treated Effluent Disposal Facility. TRU = transuranic. TSD = treatment, storage, and disposal. WESF = Waste Encapsulation and Storage Facility. WIPP = Waste Isolation Pilot Plant. WRAP = Waste Receiving and Processing (Facility). WTP = Waste Treatment Plant.

Section 4.5 - Central Plateau Cleanup Assumptions and Uncertainties

In planning for the Hanford Site lifecycle, there are uncertainties considered regarding estimated scope, schedule and cost. While a number of assumptions are made to support lifecycle development, the assumptions presented here are major assumptions that drive costs.

For Soil and Water Remediation–Groundwater/Vadose Zone (PBS RL-0030), the following assumptions were identified:

- Planned characterization of the vadose zone below the high-level waste (HLW) tanks will be sufficient to evaluate remedies for protection of groundwater.
- No substantial new requirements will be added to meet the state's implementation of RCRA.

For Nuclear Facility D&D – Remainder of Hanford (PBS RL-0040), the following assumptions were identified:

- An industrial worker scenario will be used to define the exposure scenarios and the threshold cleanup levels for waste sites located in the Inner Area. Cleanup levels for waste sites in the Outer Area will support the reasonably anticipated future land use of conservation/mining.
- The Central Plateau area will remain under Federal control for the foreseeable future.
- All low-level legacy waste will be managed and treated on Hanford via remove, treat, and dispose (RTD) to approved onsite disposal facilities.

- Planning assumes that geographic aggregate barriers will be utilized. The aggregate barriers are assumed to cover canyons or other large facilities and adjacent waste sites or to cover multiple adjacent waste sites.
- Removal excavations are assumed to be 15 feet below grade for planning and estimating purposes. Decision documents will identify the actual removal excavation criteria (soil cleanup level or excavation depth) for waste sites.

For Nuclear Facility D&D – Fast Flux Test Facility Project (PBS RL-0042), the following assumption was identified:

- FFTF funding to accomplish the scope can be carried over from year to year. Beginning in FY 2019, budget levels are to reflect an optimal ramp up to complete sodium residuals cleaning, bulk sodium processing, and D4 work scope.

For Solid Waste Stabilization and Disposition–200 Area (PBS RL-0013C), the following assumptions were identified:

- New treatment facilities are not required to support longer WTP operations.
- T Plant will be available for modification to be the facility necessary for retrieval, storage, and treatment/processing of all Hanford RCRA transuranic mixed (TRUM) waste as required by TPA M-091-01.
- WIPP will remain operational through the end of Hanford cleanup operations that have the potential to generate TRU waste. Current planning has processing and shipping of TRU waste to WIPP until FY 2030.

SECTION 5 – TANK WASTE CLEANUP

Not Included

SECTION 6 - MISSION SUPPORT

The Mission Support function is service-oriented and provides key infrastructure, utility, resource, and other Hanford site-wide cleanup support. DOE has responsibilities to protect personnel, nuclear material, and physical property on the Hanford Site. These activities are performed under Safeguards and Security (PBS RL-0020). DOE works closely with the regulatory agencies and community to provide support to Hanford cleanup through Richland Community and Regulatory Support (PBS RL-0100).

There are a number of infrastructure-related Mission Support activities in place to support cleanup of the Hanford Site. These Mission Support activities are managed under Nuclear Facility D&D – Remainder of Hanford (PBS RL-0040). Following cleanup efforts at the Hanford Site, DOE will have ongoing activities to maintain the protectiveness of the cleanup actions and support transition to future land uses. This period is referred to as LTS and is covered by PBS RL-LTS.

Section 6.1 - Safeguards and Security (PBS RL-0020)

The scope of this PBS includes one primary work element: Safeguards and Security. Table 6-1 describes the work scope. Safeguards and Security will be required until cleanup is complete, then protection of human health and the environment transfers to PBS RL-LTS. The level of effort required to ensure protectiveness may diminish as nuclear material is shipped offsite and as the cleanup progresses.

Table 6-1. Safeguards and Security (PBS RL-0020) Level 2 Scope Summary.

Work Element	Scope Description
Safeguards and Security	This work element includes management, training, and equipment for staff; physical protective systems, such as intrusion protection, Hanford Site access, and badging; information and cyber security; personnel security; material control and accountability; and security program management.
PBS = project baseline summary.	RL = U.S. Department of Energy, Richland Operations Office.

Section 6.2 - Infrastructure and Services (PBS RL-0040)

Infrastructure and Services play a key role in completing the cleanup mission, and as noted in Sections 2.0 and 4.0, the work scope is included within PBS RL-0040.

Reliability Projects and HAMMER

Infrastructure and Services (PBS RL-0040) provides cost-effective infrastructure and site services that are essential to accomplishing the Hanford Site environmental cleanup mission. These essential services cover a broad spectrum and range from the basic to highly-specialized services that reflect the complexity and scale of the environmental cleanup mission. The scope description for these work elements is provided in Table 6-3.

Table 6-3. Infrastructure and Services (PBS RL-0040) Level 2 Scope Summary.

Work Element	Scope Description
Reliability Projects	Includes repair and replacement of infrastructure systems and provides capital upgrades to the infrastructure, including larger scale expense projects. Also included are construction and capital equipment expenditures associated with replacements for biological control, crane and rigging, electrical system, facilities, Hanford Fire Department, network and telecommunications, studies and estimates, transportation, water and sewer utilities and other infrastructure reliability projects.
HAMMER	Includes operations and maintenance activities at the HAMMER facility in support of the Hanford Site and other training programs.

Work Element	Scope Description
Site-wide Services and Other Distributed Costs	<p>Includes proportional share of costs for site services and infrastructure. This work element includes emergency services (safeguards and security, fire and emergency response, emergency management), environmental integration services (site-wide safety standards, environmental integration, public safety and resource protection, radiological site services, and offsite laboratory sample analysis), information management (information management planning and controls, information systems, content and records management, infrastructure/cyber security, information resources/content management, and information support services), site infrastructure and utilities/logistics and transportation (roads and grounds, biological services, electrical services, water/sewer services, facility services, transportation, mail, property systems/acquisitions, railroad services, technical services, energy management, work management, land and facilities management), support functions (business operations, human resources, safety, health and quality), and portfolio management (portfolio planning, analysis and performance, project acquisition and support, and independent assessment and analysis).</p> <ul style="list-style-type: none"> - Includes contracted technical services in key areas such as audit, regulatory analysis, cost and risk analysis and estimating. Also includes mission critical support services to DOE and its contractors in key areas such as occupational medicine, information and telecommunications, janitorial, radiological laundry, electrical power and facilities rentals; critical independent legal counsel and litigation services in support of DOE and its contractors; and other mission critical support services to DOE and its contractors in key areas such as land transfers, acquisition and contract closeout, acquisition of natural gas utility services, energy conservation and management (including steam), natural resource trusteeship, Tribal Nation support, and other small contracts. - Includes contractor's fee, management reserve, allocated pensions and General and Administrative allocations.
DOE = HAMMER =	<p>U.S. Department of Energy. Hazardous Materials Management and Emergency Response Training and Education Center.</p> <p>PBS = project baseline summary. RL = U.S. Department of Energy, Richland Operations Office.</p>

Site-Wide Services

The Site-wide Services program provides direct operations support to RL, ORP, and their contractors with cost-effective infrastructure and site services integral and necessary to accomplish the environmental cleanup mission. The scope includes five primary functions: Safety, security and environment; site infrastructure and utilities; site business management; information resources and content management; and portfolio management.

Under the safety, security and environment function, both Safeguards and Security (PBS RL-0020) and HAMMER (PBS RL-0040, are funded through their respective projects and not through Site-wide Services. Other work elements under the safety, security and environment function include: Fire and emergency response services; emergency operations; site safety standards; radiological assistance program; environmental regulatory management; public safety and resource protection; and radiological site services.

The work elements under the site infrastructure and utilities function include: Offsite laboratory sample analysis; biological control; facility services; transportation; railroad services; roads and grounds; utilities (water, electricity), sewer systems; and sanitary waste management and disposal.

The work elements under the site business management function include: Real property asset management; property systems/acquisition and materials management; sponsorship, management and administration of employee pension and other benefits plans; Energy Employees Occupational Illness Compensation Program Act/workers compensation; external affairs and other interactions; mail services; and reproduction, correspondence control and multi-media.

As part of real property asset management, RL has established the LTS program to provide planning and interim execution of LTS for portions of the Hanford Site as they are cleaned up and before they are transferred to the DOE Office of Legacy Management (LM). The current LTS program is part of PBS RL-0040 Infrastructure and Services until it is transferred to LM – this future LTS program under LM is referred to as PBS RL-LTS in this report. The scope of the current and future LTS program is described in Section 6.3.

The work elements under the information resources and content management function include: Strategic planning and program management; telecommunications; information systems; and content (records) management.

The work elements under the portfolio management function include: Hanford portfolio planning, analysis and performance assessment; project acquisition and support; and independent analysis and assessments.

Section 6.3 - Long-Term Stewardship (PBS RL-LTS)

Following the completion of Hanford cleanup actions, the disposal facilities and other areas will require long-term management. Administration of the institutional controls activities will be required for portions of the Hanford Site to ensure protection of human health and the environment. As portions of the site are cleaned up, they are managed in accordance with the Hanford Site Long-Term Stewardship Program, as described in DOE/RL-2010-35, Hanford Long-Term Stewardship Program Plan, under PBS RL-0040 Infrastructure and Services. When all of the cleanup actions defined by decision documents are completed, the Hanford Site will be turned over to DOE-LM. This PBS element pertains to the LM activities at Hanford.

LTS refers to all activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization at a site or a portion of a site. LTS includes engineered and institutional controls designed to contain or to prevent exposures to residual contamination and waste, such as surveillance activities, recordkeeping activities, inspections, groundwater monitoring, ongoing pump-and-treat activities, cap repair, maintenance of entombed buildings or facilities, maintenance of other barriers and containment structures, access control, and posting signs. LTS begins when cleanup is completed and the selected remedy cleanup objectives and goals are met, as defined by the applicable CERCLA or RCRA decision documents, or when long-term remediation systems are constructed and operating as intended (e.g., groundwater pump-and-treat systems).

The current Hanford Site LTS Program manages the geographic areas for which cleanup has been completed in accordance with the post-cleanup requirements specified in the associated decision documents. These decisions include, but are not limited to, the CERCLA RODs and RCRA post-closure plans. In addition to managing the post-cleanup completion obligations, the LTS Program manages Hanford's natural and cultural resources through the framework of DOE/EIS-0222-F and 64 FR 61615, "Record of Decision: Hanford Comprehensive Land Use Plan Environmental Impact Statement (HCP EIS)," and in accordance with Federal laws, executive orders, Tribal Nation treaties, DOE directives, and Hanford Site procedures. The planning basis for the Hanford Site LTS Program scope integrates stewardship and institutional controls elements into the program from present day to 2060.

The scope, schedule and costs of LTS and institutional controls, to the extent predictable, have been included in this LCR for the period from 2060 to 2090. The Federal Government will have a presence at Hanford well beyond 2090 – especially in the Inner Area of the Central Plateau – to ensure that the cleanup remedies remain protective of people and the environment. Table 6-4 provides a summary of the scope.

Table 6-4. Long-Term Stewardship (PBS RL-LTS) Level 2 Scope Summary.

Work Element	Scope Description
Infrastructure and Waste Management	Includes operation and maintenance of Hanford Site infrastructure following cleanup activities. Specific scope will include supplying electrical and water utilities, operating and maintaining emergency services (Hanford Fire Department), and maintaining roads as needed to support Hanford Site Long-Term Stewardship activities. Includes operation and maintenance of 200 Area liquid effluent facilities in support of groundwater treatment and monitoring activities.
Site and Environmental Monitoring	Includes ongoing Hanford Site and environmental monitoring of groundwater, soil, vadose zone, and monitoring for public safety and resource protection.
Post-Closure Surveillance and Maintenance, and Environmental Compliance	Includes real estate and Hanford Site planning, land management, and surveillance and maintenance activities for the 100 and 200 Areas. Includes activities to ensure environmental compliance and protection.
Payment in Lieu of Taxes	Includes payment in lieu of taxes.
Management and Administration	Provides for management and administration of these Long-Term Stewardship activities.

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APPENDIX A

HANFORD SITE EXISTING CLEANUP DECISIONS

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TERMS

AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CCN	correspondence control number
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
D&D	decontamination and decommission
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DOE/RL	U.S. Department of Energy, Richland Operations Office
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERA	expedited response action
ERDF	Environmental Restoration Disposal Facility
ESD	explanation of significant differences
HLW	high-level waste
IC	institutional controls
INL	Idaho National Laboratory
ISRM	in situ redox manipulation
ISS	interim safe storage
LCR	Lifecycle Report
MCL	maximum contaminant level
NPL	National Priorities List
NTCRA	non-time-critical removal action
OU	operable unit
P&T	pump-and-treat
PCB	polychlorinated biphenyl
PFP	Plutonium Finishing Plant
PRG	preliminary remediation goal
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RD/RAWP	remedial design/remedial action work plan
ROD	record of decision
RTD	remove, treat, and dispose
SNF	Spent Nuclear Fuel
SST	single-shell tank
TCRA	time critical removal action
TPA	Tri-Party Agreement
TRU	transuranic
TSD	treatment, storage, and disposal
WIDS	Waste Information Data System
WIPP	Waste Isolation Pilot Plant
WTP	Waste Treatment and Immobilization Plant

APPENDIX A

HANFORD SITE EXISTING CLEANUP DECISIONS

Pursuant to the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as Tri-Party Agreement (TPA), M-036-01 requires the U.S. Department of Energy (DOE) to prepare an annual *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report [LCR]). The LCR is expected to reflect all actions necessary for DOE to meet all applicable environmental obligations as it completes the Hanford cleanup mission. These environmental obligations are established in accordance with various decision-making processes that DOE, the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology) (Tri-Party agencies), and other agencies conduct under Federal and State regulatory programs.

Several decisions affecting the Hanford cleanup mission have been made, and actions to implement these decisions have been completed, or are/will soon be under way. Many other cleanup decisions, however, cannot be made yet, are in preliminary planning stages, and/or are the subject of final agreements that are being developed. The absence of final decisions is addressed in TPA M-036-01:

“In circumstances where final cleanup decisions have not yet been made, the report shall be based upon the reasonable upper bound of the range of plausible alternatives or may set forth a range of alternative costs including such a reasonable upper bound.”

This appendix provides current information about decisions that affect cleanup, and when these decisions might be considered to be final cleanup decisions for LCR purposes. Specifically:

- **Section A.1** provides a general overview of the principal processes that are employed at Hanford to reach decisions about future cleanup actions.
- **Section A.2** describes in more detail the Federal and State decisions that can affect Hanford cleanup, the legal and/or regulatory authorities on which the decision making is based, and the types of documents used to embody and formalize these decisions.
- **Section A.3** summarizes current decisions that, for purposes of this LCR, are considered to be cleanup decisions and which cleanup decisions can be identified as final cleanup decisions.

This appendix will be updated to reflect new and changed final cleanup decisions and to provide a basis each year for determining cleanup actions to evaluate in the latest LCR.

A-1 - PRINCIPAL HANFORD CLEANUP DECISION-MAKING PROCESSES

To implement the cleanup mission, the Tri-Party agencies reach decisions about what actions need to be performed to protect public and worker health and the environment. Cleanup decisions are based on a variety of legal and regulatory authorities such as the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA) (42 USC 9601) and the *Resource Conservation and Recovery Act of 1976* (RCRA) (42 USC 6901) that require the consideration of various alternatives before selecting cleanup actions. In some cases, the agencies develop interim or partial decisions that enable cleanup work to proceed pending the ability to make final decisions (e.g., to alleviate urgent concerns, acquire better information, develop technological advances, obtain needed funding).

The TPA is the primary legal framework that the Tri-Party agencies use to achieve Hanford cleanup. Cleanup decisions made through the TPA integrate and implement primarily the following regulatory processes:

- CERCLA processes will support remedial decision making for most past-practice waste sites, canyon facilities, and structures that contain radioactive contamination or other hazardous substances. The TPA also identifies a subset of waste sites as RCRA past-practice sites. Consistent with EPA directives and guidance, the TPA establishes the expectation that either a RCRA corrective action or a CERCLA remedial action will lead to an equivalent cleanup result. In practice, this expectation

becomes complicated when radioactive materials are present because RCRA authority does not extend to radionuclides. Regardless of this issue with RCRA, cleanup of radionuclides in RCRA

waste sites will be protective and consistent with CERCLA cleanup practices.

- RCRA closure processes generally will be used to achieve final closure decisions for active RCRA treatment, storage, and disposal (TSD) facilities. RCRA corrective action processes also are applicable when RCRA wastes from past hazardous waste practices must be cleaned up. EPA has delegated implementation of the RCRA program to the State of Washington. Ecology implements the program via RCRA-equivalent State regulations and through facility-specific permits. RCRA closure and post-closure requirements are contained in the Hanford Site RCRA Permit (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*).

The clear intent of the TPA is to minimize duplication and overlap of regulatory authorities while ensuring compliance with applicable requirements. As noted above, RCRA authority does not extend to the cleanup of radionuclides, while CERCLA does. The TPA states that the cleanup process selected for an operable unit (OU) will be sufficiently comprehensive to satisfy the technical requirements of both authorities and the respective regulations.

In addition to RCRA and CERCLA, DOE is responsible for regulating the radioactive materials that it manages, including setting standards that affect cleanup decisions for radionuclides. DOE O 435.1, *Radioactive Waste Management*, defines additional requirements and processes that are applicable to cleaning up radioactive facilities and media. DOE develops and implements cleanup decisions under this regulatory program.

Land use is also an important factor in making cleanup decisions because remedial action objectives are to reflect the reasonably anticipated future land use(s). These future land-use assumptions allow risk assessments and feasibility studies to focus on developing practical and cost-effective remedial alternatives. These alternatives should then support future site activities that are consistent with the reasonably anticipated future land use. DOE is responsible for designating land uses on the Hanford Site and for identifying future land uses that will guide risk assessments and cleanup decisions. Pursuant to a record of decision (ROD) published on November 2, 1999 (64 FR 61615, “Record of Decision: Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS)”) and amended ROD published on September 26, 2008 (73 FR 55824, “Amended Record of Decision for the Hanford Comprehensive Land-Use Plan Environmental Impact Statement”), DOE has adopted and implemented a comprehensive land-use plan for the Hanford Site. As DOE’s decision stated:

“The purpose of this land-use plan and its implementing policies and procedures is to facilitate decision making about the site’s uses and facilities over at least the next 50 years. The Department’s decision seeks to balance the Department’s continuing land-use needs at Hanford with its desire to preserve important ecological and cultural values of the site and allow for economic development in the area.” (64 FR 61615 – 61616)

An area as large and complex as the Hanford Site has an extraordinary number of regulatory decisions that need to be made to carry out the cleanup mission. While many cleanup decisions have been made, only some of these decisions are considered to be final; many are either interim decisions, or decisions that lay the groundwork for future final decisions. The rest of this appendix provides a more extensive discussion of the decisions that have been made and that affect cleanup of Hanford, and includes several tables that list and summarize the effects of these decisions.

A.1 DECISIONS THAT CAN AFFECT HANFORD CLEANUP

A.1.1 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 DECISIONS

CERCLA, as modified by the *Superfund Amendments and Reauthorization Act 1986* (42 USC 103), established the Federal program to cleanup uncontrolled or abandoned waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Under 40 CFR 300, “National Oil and Hazardous Substances Pollution Contingency Plan,” DOE is the lead agency with lead agency responsibilities by the National Contingency Plan and Executive Order 12580, *Superfund Implementation*. EPA is the lead regulatory agency under the TPA and oversees the cleanup

activities conducted under 40 CFR 300. EPA also has certain oversight authorities granted through CERCLA and the TPA. The most common documentation used to implement cleanup decisions under CERCLA includes the following:

- **CERCLA ROD.** The CERCLA ROD is a public document, developed from information generated during the remedial investigation/feasibility study that explains which remediation alternatives will be used to clean up a site. A ROD contains information about the site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, scope and role of response action, and the remedy selected for cleanup. RODs can be final or interim; interim RODs are used to allow cleanup actions to proceed until a final decision can be reached.
- **Explanation of Significant Differences and ROD Amendment.** Documents used to modify or clarify an existing ROD. The Explanation of Significant Difference is used when changes to a component of a remedy do not fundamentally alter the overall cleanup approach. The amendment is used when there are fundamental changes, or a number of significant changes, that together have the effect of a fundamental change to the remedy selected in the ROD.
- **Action Memorandum.** A public document used to exercise the CERCLA removal authority and enable cleanup action to proceed where a site presents a relatively time-sensitive, non-complex problem that can and should be readily addressed.

Several CERCLA documents have been completed that include or have resulted in decisions that affect cleanup. These CERCLA documents and summaries of the relevant cleanup decisions are listed in Section A.3.

A.1.2 PERMITS, LICENSES, AND OTHER STATUTORY/REGULATORY PROGRAM APPROVALS

RCRA, as modified by the *Hazardous and Solid Waste Amendments of 1984*, gave EPA authority to control the generation, transportation, and TSD of hazardous waste. The amendments expanded the scope of RCRA to require corrective action for certain releases of hazardous waste constituents to the environment from RCRA facilities regardless of time of release (similar to CERCLA remedial action). Unlike CERCLA, EPA may delegate authority for implementing RCRA to the states, and in Washington state, Ecology has lead authority for most elements of RCRA. Principal documents used to implement Hanford cleanup decisions under RCRA include:

- **Final Status Permit.** A final status permit includes explicit descriptions of the conditions and requirements that must be met by a facility at which TSD of regulated hazardous waste (or dangerous waste, in Washington State) occur. A TSD facility may receive a final status permit even though it is closed and not operating, if there are ongoing caretaking activities that must be maintained after closure (i.e., during the post-closure care period). At Hanford, a single final status permit covers the entire site, but is being issued in phases because of the number of TSD facilities that exist. The final status permit includes decisions about how Federal and State statutes, regulations, and guidance have been interpreted and applied to specific activities conducted at each TSD facility.
- **Closure/Post-Closure Plan.** Some TSD facilities have closed or may close before they are covered under the final status permit. In such cases, a closure plan must be prepared to describe the activities necessary to close the TSD facility and address any remaining dangerous wastes. If dangerous waste will remain after closure, a post-closure plan is required to address residual contamination. Ecology must approve closure/post-closure plans before they are implemented, and in the process, decisions will be made and included in the closure/post-closure plans about how to close the TSD facility and, where required, conduct post-closure care. **Corrective Action.** Corrective actions to cleanup releases from RCRA TSD facilities may be required before a final status permit is issued. Decisions about degree/methods for cleanup will be made and implemented through a corrective action plan approved by Ecology.

In addition to RCRA, several other programs authorized under existing Federal and State statutes and regulations require permits, licenses and other approvals that can affect cleanup at Hanford. These other

decision documents establish, among other conditions, limits on emissions of radionuclides and other hazardous constituents to the air, water, and ground. Section A.3 lists the various permits, licenses, and other types of approvals authorized under applicable regulatory and statutory programs that include or have resulted in decisions affecting Hanford cleanup.

A.1.3 TRI-PARTY AGREEMENT DECISIONS

Among other functions, the TPA helps define how CERCLA and RCRA programs will be implemented when they have overlapping authorities. The TPA is used to determine which decision-making process and documentation (e.g., CERCLA ROD, RCRA permit) will be used to establish cleanup actions for the waste sites and facilities at Hanford, but it is that subsequent documentation (not the TPA) where cleanup decisions are formally established. These may include provisions that set specific waste retrieval objectives and technology performance standards for certain types of cleanup actions. These TPA-based decisions are listed in Section A.3.

A.1.4 OTHER FEDERAL AND STATE DECISIONS

There are a variety of other decisions embodied in executive, legislative, and judicial documents that can affect cleanup at Hanford. Section A.3 lists various Executive Orders, Presidential Proclamations, Congressional Acts, judicial orders/decrees, and Federal and State decisions that may affect cleanup.

A.2 SUMMARY OF HANFORD CLEANUP DECISIONS – FINAL AND NOT YET FINAL

The statutory/regulatory authorities discussed in Section A.2 resulted in a multitude of national, regional, and/or State decisions across numerous projects and programs. Some of these decisions establish environmental obligations that affect the cleanup mission and are summarized in this section.

While some decisions more clearly affect Hanford than others, care has been taken to include decisions that have indirect effects on cleanup. Examples of such indirect decisions might include those that define national standards for risk-based exposure limits, enable offsite activities that contribute contaminants to Hanford environmental media, or constrain the ability to disposition materials or wastes at or from Hanford. As stated earlier, the LCR is required to consider cleanup alternatives “where final cleanup decisions have not yet been made” (TPA M-036-01, third paragraph) at Hanford. Some cleanup decisions may appear to be final but are not:

- They may be “interim” remedies until a final cleanup decision can be made, or
- They may be “partial” actions within a much larger cleanup effort.

Even where final decisions have been made, there are legal mandates to perform periodic reviews to ensure that selected remedies continue to be effective; new decisions may be needed depending on how well cleanup actions are working. To stay as simple as possible, the term “final” has been interpreted literally.

For purposes of this LCR, a cleanup decision will be treated as a final cleanup decision if:

- The decision is embodied in a statutory/regulatory document that is titled final (e.g., final permit, final ROD); or
- The decision is explicitly represented as final in a document, and such representation is compliant with the statutory/regulatory authority that produced the document.

Hanford cleanup decisions summarized in Tables A-1, A-3, and A-5 indicate whether the decision is considered to be final by placing the word **FINAL** after the decision title in the first column. In addition to decisions that have been made, whether final or not, many cleanup decisions are yet to be made. By definition, the absence of a decision means there is not a final cleanup decision. It would be very difficult to develop an exhaustive list of all the decisions that still need to be made to complete Hanford cleanup. However, as these decisions are reached, they will be incorporated into this section of the LCR.

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

Record of Decision			
Title: <i>Record of Decision, USDOE Hanford 1100 Area (EPA/ROD/R10-93/063) FINAL</i> ROD Type: CERCLA Final ROD Area: 1100 Date Approved: Sep-93 Initial Decision: Cap Horn Rapids Landfill; offsite disposal of PCB-contaminated soils; offsite incineration of bis (2-ethylhexyl) phthalate contaminated soils; monitored natural attenuation of groundwater contamination.			
Revision Title	Type	Date	Revised Decision
<i>Explanation of Significant Differences for the Record of Decision for the USDOE Hanford 1100 Area Benton County, Washington (EPA 2010a)</i>	ESD	Sep-10	Documents significant differences to the selected remedies in the ROD. In summary, this ESD clarifies the IC requirements for the Horn Rapids Landfill.
Record of Decision			
Title: <i>Declaration of the Record of Decision for the Environmental Restoration Disposal Facility (EPA/ROD/R10-95/100) FINAL</i> ROD Type: CERCLA Final ROD Area: 200 West Date Approved: Jan-95 Initial Decision: Initial construction of two cells; maximum size of 1.6 mi ² ; landfill construction in accordance with RCRA; capped at completion.			
Revision Title	Type	Date	Revised Decision
<i>USDOE Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Difference (ESD) (EPA/ESD/R10-96/145)</i>	ESD	Jul-96	Allow disposal of investigation-derived waste and RCRA past-practice waste to ERDF; allow disposal of non-process inactive TSD waste to ERDF; allow use of ERDF leachate for dust suppression/compaction activities at ERDF.
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary, (also see proposed plan for amendment) (EPA/AMD/R10-97/101)</i>	Amended ROD	Sep-97	Authorizes two additional disposal cells and the option of treating waste as needed by containerization and encapsulation at ERDF instead of at the OU.
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary, (also see proposed plan for amendment) (EPA/AMD/R10-99/038)</i>	Amended ROD	Mar-99	Establishes conditional approval for delisting of the ERDF leachate.
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site – 200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary, (also see</i>	Amended ROD	Jan-02	Authorizes four additional disposal cells and the option of staging waste at ERDF pending treatment and/or disposal.

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

proposed plan for amendment) (EPA/AMD/R10-02/030)			
<i>U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site-200 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary (EPA 2007a)</i>	Amended ROD	May-07	Allows specific waste, such as waste associated with surveillance and maintenance of Hanford facilities, environmental research/development activities, sample analyses, liquid effluent waste treatment, infrastructure support, and environmental monitoring programs, to be disposed at ERDF; identifies a plug-in approach for ERDF disposal of additional similar Hanford cleanup waste generated in support of RCRA/CERCLA cleanup actions.
<i>Declaration: U.S. Department of Energy, Environmental Restoration Disposal Facility, Hanford Site - 200 Area, Benton County, Washington (EPA 2009a)</i>	Amended ROD and ESD	Aug-09	Allows for ERDF expansion of an area equal to 4 cells or 2 super cells; updates cell design to allow super cell concept and allows for ERDF expansion via EPA approval and fact sheets rather than ROD amendments.
Record of Decision			
Title: <i>Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit (EPA/ROD/R10-95/114)</i> ROD Type: CERCLA Interim Action ROD Area: 200 West; 200-ZP-1 OU Date Approved: May-95 Initial Decision: P&T to address carbon tetrachloride, chloroform, and trichloroethylene; treatment with air stripping and vapor phase activated carbon; interim action to continue until final action instituted; reinjection of treated water.			
Record of Decision			
Title: <i>Record of Decision, Hanford 200 Area, 200-ZP-1 Operable Unit Superfund Site, Benton County, Washington (EPA 2008) FINAL</i> ROD Type: CERCLA Final ROD Area: 200 West; 200-ZP-1 OU Date Approved: Sep-08 Initial Decision: P&T to address carbon tetrachloride, nitrate, chromium, trichloroethylene, I-129, Tc-99, and tritium; monitored natural attenuation; flow-path control through injection of treated water; and ICs.			
Record of Decision			
Title: <i>Declaration of the Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-95/126)</i> ROD Type: CERCLA Interim Action ROD Area: 100; 100-BC-1, 100-DR-1, and 100-HR-1 OUs Date Approved: Sep-95 Initial Decision: Remove contaminated soil, structures and debris using the Observational Approach; treatment, by thermal desorption to remove organics and/or soil washing for volume reduction, or as needed to meet waste disposal criteria; disposal of contaminated materials at ERDF; backfill of excavated areas followed by revegetation.			
Revision Title	Type	Date	Revised Decision
<i>Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington (see Draft B ESD and Proposed Amendment documents preceding this ROD amendment) (EPA/AMD/R10-97/044)</i>	Amended ROD	Apr-97	Incorporates 34 additional waste sites into the ROD; refines remedial cost estimate for original 37 sites and additional 34 sites based on actual data, streamlining, and lessons learned; documents that soil washing is not an effective treatment.
Record of Decision			
Title: <i>Declaration of the Record of Decision for the 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-96/151) FINAL</i> ROD Type: CERCLA Final ROD Area: 100; 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 OUs Date Approved: Feb-96 Initial Decision: No action.			

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

Record of Decision			
Title: Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-96/134) ROD Type: CERCLA Interim Action ROD Area: 100; 100-H, 100-K Date Approved: Mar-96 Initial Decision: Interim action to remove hexavalent chromium from groundwater; 30 extraction wells; ion exchange treatment; reinject treated effluent; monitor; institute ICs.			
Revision Title	Type	Date	Revised Decision
U.S. Department of Energy Hanford Site – 100 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary (EPA/AMD/R10-00/122)	Amended ROD	Oct-99	Implements In Situ Redox Manipulation barrier for second chromium plume in 100-HR-3 OU; existing P&Ts remain in operation.
Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision (EPA 2002)	ESD	Oct-02	Provides justification for increased schedule/cost from the 1999 Amendment associated with a greater number of wells and aquifer thickness that affected implementation of the ISRM barrier.
Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision (EPA/ESD/R10-03/606)	ESD	Mar-03	Provides justification for increased schedule/cost from the 1999 Amendment associated with a greater number of wells and aquifer thickness that affected implementation of the ISRM barrier.
Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009b)	ESD	Aug-09	Provides justification for increased cost and location of reinjection wells from the 1999 Amendment associated with operation beyond initial 5-year estimate and need to control plume migration.
Record of Decision			
Title: Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington, (EPA/ROD/R10-96/143) Note: The ROD is only FINAL for the 300-FF-1 OU; it is an interim action for 300-FF-5 OU. ROD Type: CERCLA Final ROD Area: 300; 300-FF-1 and 300-FF-5 OUs Date Approved: Jul-96 Initial Decision: 300-FF-1: Remove contaminated soil and debris; dispose at ERDF; backfill and recontouring; ICs. 300-FF-5: Monitoring and ICs for groundwater.			
Revision Title	Type	Date	Revised Decision
USDOE Hanford 300 Area, 300-FF-1 Operable Unit, Hanford Site, Benton County, Washington Explanation of Significant Difference (ESD) (EPA/ESD/R10-00/505)	ESD	Jan-00	Provides a site-specific land disposal restriction treatability variance for lead contamination found in the 628-4 or Landfill 1D waste site.
Explanation of Significant Difference for the 300-FF-5 Record of Decision (EPA/ESD/R10-00/524)	ESD	Jun-00	Expanded scope of 300-FF-5 ROD to include groundwater in 300 Area, including 300-FF-2 sites and any sites plugged into 300-FF-1 ROD.
Record of Decision			
Title: Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit (EPA/ROD/R10-01/119) ROD Type: CERCLA Interim Action ROD Area: 300; 300-FF-2 OU Date Approved: Apr-01 Initial Decision: Remove contaminated soil, structures, and debris; treat as needed; dispose at ERDF, WIPP, or other; backfill and revegetate; establish ICs; continued groundwater monitoring; and define plug-in approach.			

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

Revision Title	Type	Date	Revised Decision
<i>Explanation of Significant Differences for the 300-FF-2 Operable Unit Record of Decision (EPA 2004b)</i>	ESD	May-04	Modified uranium soil cleanup level from 350 to 267 pCi/g based on engineering study to ensure protectiveness of the groundwater and river; modified land-use assumption for 8 outlying waste sites from industrial to unrestricted, changed cleanup levels for these sites to those consistent with 100 Area cleanup.
<i>Explanation of Significant Differences for the 300-FF-2 Operable Unit Interim Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009e)</i>	ESD	Aug-09	Incorporates 14 plug-in sites into the ROD and subsequent ESDs; incorporates 2 newly discovered sites into the ROD and subsequent ESDs; allows future newly discovered sites to be incorporated into the ROD and ESDs as long as cost impacts are within specified limits.
<i>Explanation of Significant Differences, Hanford 300 Area, 300-FF-2 Operable Unit, 618-10 Burial Ground (EPA 2011b)</i>	ESD	Aug-11	Modified remedy to allow necessary treatment of liquid waste in bottles, up to 1 gal/bottle, to occur in trays within the excavation area in accordance with an approved work plan.
Record of Decision			
<p>Title: Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1 Hanford Site, Benton County, Washington (EPA and DOE, 2013) FINAL</p> <p>ROD Type: CERCLA Final ROD</p> <p>Area: 300; 300-FF-1, 300-FF-2 and 300-FF-5</p> <p>Date Approved: Nov-13</p> <p>Initial Decision: This ROD selects a remedy for the waste sites in 300-FF-2, a remedy for the groundwater in 300-FF-5 and amends the remedy for three 300-FF-1 waste sites. The interim action remedy for 300-FF-5, selected in 1996 and the interim action remedy for 300-FF-2 selected in 2001 are replaced with this final action remedy. The remedy for 300-FF-1 selected in 1996 is amended for additional remedial action of uranium from three sites. Contaminated buildings are being removed in accordance with CERCLA Action Memoranda and are not part of the OUs addressed by this ROD.</p> <p>The major components of the selected remedy for the 300-FF-2 OU are:</p> <ul style="list-style-type: none"> • Remove, treat and dispose (RTD) at waste sites • Temporary surface barriers and pipeline void filling • Enhanced attenuation of uranium using sequestration in the vadose zone, PRZ and top of the aquifer • ICs, including the requirement that DOE prevent the development and use of property that does not meet residential cleanup levels at the 300 Area Industrial Complex and 618-11 for other than industrial uses, including use of property for residential housing, elementary and secondary schools, childcare facilities and playgrounds. <p>The major components of the selected remedy for the 300-FF-5 OU are:</p> <ul style="list-style-type: none"> • Monitored Natural Attenuation • Groundwater monitoring • Enhanced attenuation of uranium at the top of aquifer • ICs. <p>The major component of the amended remedy for 300-FF-1 is:</p> <ul style="list-style-type: none"> • Enhanced attenuation of uranium using sequestration in the vadose zone, PRZ and top of the aquifer. 			
Record of Decision			
<p>Title: Record of Decision, Hanford 200 Area, Superfund Site 200-CW-5 and 200-PW-1, 200-PW-3 and 200-PW-6 Operable Units Hanford Site, Benton County, Washington (EPA 2011c) FINAL</p> <p>ROD Type: CERCLA Final ROD</p> <p>Area: 200 East and 200 West</p> <p>Date Approved: Sep-11</p> <p>Initial Decision: RTD of soil and debris to specified depths cleanup levels for plutonium-contaminated soils and subsurface structures/debris. Soil vapor extraction at three 200-PW-1 waste sites will continue until vadose zone cleanup levels are met. Soil covers will be used to a depth of at least 15 ft over cesium-contaminated soils. Removal of sludge followed by tank stabilization for two tanks. No action for two waste sites. ICs and long-term monitoring for waste sites where contamination is left in place and an unrestricted land use is precluded.</p>			

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

Record of Decision			
Title: Declaration of the Record of Decision, USDOE Hanford 200 Area, Hanford Site, Benton County, Washington (EPA/ROD/R10-97/048) ROD Type: CERCLA Interim Action ROD Area: 200 West; 200-UP-1 OU Date Approved: Feb-97 Initial Decision: Extract groundwater from high concentration zone of uranium and Tc-99 plumes and treat at Effluent Treatment Facility.			
Revision Title	Type	Date	Revised Decision
Explanation of Significant Differences for the Interim Action Record of Decision for the 200-UP-1 Groundwater Operable Unit, Hanford Site, Benton County, Washington (EPA 2009c)	ESD	Feb-09	Adds National MCL of 30 µg/L for uranium as ARAR for treating extracted water; replaces 190 gal/min pumping with a pumping requirement from existing and new wells consistent with approved RD/RAWP until uranium and Tc-99 concentrations are less than 10 times the MCL for 4 consecutive quarters; adds sampling requirements and updates cost estimates and IC requirements.
Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site 200-UP-1 Operable Unit (EPA 2012)	Interim Action ROD	Sep-12	Supersedes previous interim action ROD (Feb-97) and ESD (Feb-09). Includes groundwater extraction/treatment (with flow path control through injection of treated water) in combination with monitored natural attenuation for Tc-99, uranium, chromium (total and hexavalent), nitrate, carbon tetrachloride and tritium; hydraulic containment and further treatment technology evaluation for I-129; remedy performance monitoring and ICs.
Record of Decision			
Title: Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington (EPA/ROD/R10-99/039) ROD Type: CERCLA Interim Action ROD Area: 100, 200 North Date Approved: Jul-99 Initial Decision: RTD for 46 sites; plug-in approach for remaining 100 Area and 200 North sites; plug-in approach for newly identified 100 Area sites; disposal of debris from B, D, H, and K reactors to ERDF; provides decision framework for leaving waste in place, generally below 15-ft depth.			
Revision Title	Type	Date	Revised Decision
Explanation of Significant Difference for the 100 Area Remaining Sites ROD, USDOE Hanford 100 Area, 100-IU-6 Operable Unit, Hanford Site, Benton County, Washington (EPA/ESD/R10-00/045)	ESD	Jun-00	Plugs in 600-23 and JA Jones #1 waste sites to the Remaining Sites ROD.
Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision (EPA 2004a)	ESD	Feb-04	Adds 28 sites to ROD; adds 10 CFR 1022 and 40 CFR 6, Appendix A as ARARs to ROD; revises annual ICs report date to be coincident with the due date for the Sitewide ICs Plan for Hanford CERCLA Response Actions.
Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2009d)	ESD	Aug-09	Authorizes adding 200-CW-3 OU wastes sites, 99 newly discovered waste sites, and 87 candidate sites using the plug-in approach in the ROD and any newly discovered waste sites that will be documented in the Administrative Record and in an annual fact sheet.

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

Record of Decision			
Title: <i>Record of Decision Hanford 100 Area Superfund Site 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units</i> (EPA 2014) FINAL ROD Type: CERCLA Final ROD Area: 100 Area Date Approved: Sep-14 Initial Decision: RTD at 91 waste sites, ICs at 15 waste sites, no additional action due to interim remedial actions completed at 198 waste sites, monitored natural attenuation to address nitrate, hexavalent chromium, trichloroethene, and strontium-90 in 100-FR-3 groundwater and ICs.			
Record of Decision			
Title: <i>Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington</i> (EPA/ROD/R10-99/059) ROD Type: CERCLA Interim Action ROD Area: 100-K Date Approved: Sep-99 Initial Decision: Remove spent nuclear fuel from basins; remove sludge from basins; treat and remove water from the basins; remove debris from the basins; deactivate the basins; and institute ICs.			
Revision Title	Type	Date	Revised Decision
<i>Interim Remedial Action Record of Decision Amendment, U.S. Department of Energy; 100 K Area K Basins, Hanford Site - 100 Area, Benton County, Washington</i> (EPA 2005a)	Amended ROD	Jun-05	Modifies remedy for sludge by including sludge treatment prior to interim storage and shipment to a national repository; modifies remedy for debris by including grouting in place some of the basin debris followed by removal along with the removal of the basins.
Record of Decision			
Title: <i>Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington</i> (EPA/ROD/R10-99/112) ROD Type: CERCLA Interim Action ROD Area: 100-N Date Approved: Sep-99 Initial Decision: ICs for shoreline site; in situ and RTD with ex situ bioremediation for petroleum sites; RTD for remainder of sites in 100-NR-1; maintain ERA P&T for 100-NR-2.			
Revision Title	Type	Date	Revised Decision
<i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision</i> (EPA/ESD/R10-03/605)	ESD	May-03	Removes July 31 annual ICs reporting requirements, consolidates reporting with the site-wide IC annual report; eliminates requirement to evaluate applying 30 in. of irrigation water to determine if remaining contaminants will impact groundwater; identifies need for additional ICs to preclude access to contaminated groundwater which will be incorporated into site-wide IC document.
<i>U.S. Department of Energy, 100-NR-1 and NR-2 Operable Units, Hanford Site - 100 Area, Benton County, Washington, Amended Record of Decision, Decision Summary and Responsiveness Summary</i> (EPA 2010b)	Amended ROD	Sep-10	Deploys the apatite sequestration technology for remediating Sr-90 in the 100-NR-2 OU by extending existing apatite permeable reactive barrier to ~2,500 ft, allows for deployment of the apatite sequestration technology elsewhere in the 100-NR-2 OU in accordance with an Ecology approved work plan, and includes decommissioning the treatment components of the existing P&T system.
<i>Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington</i> (EPA 2011a)	ESD	Mar-11	Adds 45 additional waste sites in the 100-NR-1 OU for remediation by RTD (characterized per the 100-N Area sampling and analysis plan) and increases the total cost 38% to \$67,510,386.

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

<i>Explanation of Significant Difference for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington (EPA 2013)</i>	ESD	Aug-13	Adds 2 additional waste sites in the 100-NR-1 OU for remediation by RTD and increases the total cost by \$401,500.
Record of Decision			
Title: <i>Interim Remedial Action Record of Decision Declaration, U.S. Department of Energy 100 Area, 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington (EPA/ROD/R10-00/120)</i> ROD Type: CERCLA Interim Action ROD for 2 RCRA TSDs and an associated site Area: 100-N Date Approved: Jan-00 Initial Decision: RTD of 116-N-1 and 116-N-3 Cribs with ERDF disposal; backfill and revegetate; any pipelines will be removed or sampled and left in place based on sample results.			
Revision Title	Type	Date	Revised Decision
<i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision (EPA/ESD/R10-03/605)</i>	ESD	May-03	Removes July 31 annual ICs requirement and consolidates reporting with the site-wide IC annual report; eliminates requirement to evaluate applying 30 in. of irrigation water to determine if remaining contaminants will impact groundwater; identifies need for additional ICs to preclude access to contaminated groundwater which will be incorporated into site-wide IC document.
Record of Decision			
Title: <i>Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Units (EPA/ROD/R10-00/121)</i> ROD Type: CERCLA Interim Action ROD Area: 100 Date Approved: Sep-00 Initial Decision: Remove contaminated soil, structures, and debris; treat as needed; dispose at ERDF; backfill and revegetate. Applies to 45 burial grounds in 100 Area.			
Revision Title	Type	Date	Revised Decision
<i>Explanation of Significant Difference for the Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units (100 Area Burial Grounds) (EPA 2007b)</i>	ESD	Nov-07	Established limit of RTD excavation at the 118-B-1 Burial Ground considering the balancing factors in the ROD and required additional ICs for protection of groundwater and the Columbia River.
Record of Decision			
Title: <i>Record of Decision 221-U Facility (Canyon Disposition Initiative), Hanford Site, Washington (EPA 2005b)</i> FINAL ROD Type: CERCLA Final ROD Area: 200 West Date Approved: Oct-05 Initial Decision: Remove waste from vessels and equipment in the facility with levels of transuranic isotopes greater than 100 nCi/g and eventual disposal at WIPP; removal of liquids from the facility or treatment to remove liquids; partial removal of contaminated equipment and piping from the gallery side of the facility and dispose at ERDF; demolition and subsequent stabilization of the railroad tunnel, 271-U, 276-U, 291-U, and 292-U structures and 291-U-1 and 296-U-10 stacks and dispose at ERDF; constructing an engineered barrier; planting semiarid-adapted vegetation on the barrier; ICs; post-closure care; and ongoing barrier performance and groundwater monitoring.			
ARAR = applicable or relevant and appropriate requirement.	OU = operable unit.	P&T = pump-and-treat.	
CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act.</i>	PCB = polychlorinated biphenyl.	PRZ = Periodically Rewetted Zone.	
EPA = U.S. Environmental Protection Agency.	RCRA = <i>Resource Conservation and Recovery Act of 1976.</i>	RD/RAWP = remedial design/remedial action work plan.	
ERA = expedited response action.	ROD = record of decision.		
ERDF = Environmental Restoration Disposal Facility.			

Table A-1. CERCLA Records of Decision and Associated Changes. (8 pages)

ESD	= explanation of significant difference.	RTD	= remove, treat, and dispose.
IC	= institutional controls.	TSD	= treatment, storage, and disposal.
ISRM	= in situ redox manipulation.	WIPP	= Waste Isolation Pilot Plant.
MCL	= maximum contaminant limit.		

Unless otherwise noted in Table A-2, decisions made through Action Memoranda are considered final and are available in the TPA Administrative Record (<http://pdw.hanford.gov/arpir/>). These decisions focus mainly on the deactivation, decontamination, decommissioning, and demolition (D4) of buildings and generally are considered final actions because buildings are demolished and the waste disposed to approved facilities; or remove, treat, and dispose (RTD) of contaminated soil from waste sites, which are generally considered final actions for individual waste sites. Slabs and contaminated soils underlying the buildings may require additional decision making as part of appropriate source OUs. Similarly, waste sites that undergo RTD as a removal action will likely have a final ROD covering the decision, even though no additional cleanup activities are anticipated.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
“618-9 Burial Ground Expedited Response Action, Phase I Project Plan” (CCN 9100749)	Feb-91	TCRA	Provides for trench excavation and removal of drummed liquid wastes from 618-9 Burial Ground. Treatment and/or disposal of liquids and contaminated soils (if present) is considered part of the Phase 2 activities and is not considered time critical.
“Action Memorandum Approval: 316-5 Process Trenches, USDOE Hanford Site, Richland, WA” (CCN 9103432)	Jul-91	ERA	Provides for excavation of soil from the 316-5 Process Trenches and interim stabilization pending further remedial action as part of the 300-FF-1 OU. This AM initially was not a final action; however, the ROD for 300-FF-1 OU, which covers these trenches, is a final CERCLA action.
“Action Memorandum: Expedited Response Action Proposal for 200 West Area Carbon Tetrachloride Plume” (CCN 9200423)	Jan-92	ERA	Identifies installing a soil vapor extraction system with granular activated carbon recovery and offsite granular activated carbon regeneration at 216-Z-1A followed by systems at 216-Z-18 and 216-Z-9. While this ERA is not a final decision; a final decision has been made through the CERCLA remedial process for 200-ZP-1 OU.
“Action Memorandum Approval: Sodium Dichromate Barrel Landfill, USDOE Hanford Site, Richland, WA” (CCN 9307470)	Mar-93	ERA	Identifies excavation and disposal of drums and homestead debris from the landfill and sampling any other wastes encountered during excavation; the expedited reaction would result in cleanup of the landfill to unrestricted levels.
“Action Memorandum: Expedited Response Action Proposal; Riverland Site, USDOE Hanford Site, Richland, WA” (CCN 9305567)	Jun-93	ERA	Provides for cleanup of the Riverland Site, part of the 100-IU-1 OU, through excavation to address pesticide and hydrocarbon contamination, ordnance survey and removal, and sandblasting to decontaminate concrete.
“Action Memorandum: North Slope (Wahluke Slope) Expedited Response Action Cleanup Plan, USDOE Hanford Site, Richland, WA” (Ecology and EPA 1994a)	Mar-94	ERA	Provides for mitigation of physical hazards, excavation of the worst-case landfill, characterization of other landfills, and if needed, excavation of other landfills based on characterization results; includes investigation and as needed, mitigation of ordinance burial pits. As stated in the AM, the intent is to provide for the final removal action taken at the 100-IU-3 OU (the Wahluke Slope).

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
“Action Memorandum; N Springs Expedited Response Action Cleanup USDOE Hanford Site, Richland, WA” (<u>Ecology and EPA 1994b</u>)	Sep-94	ERA	Identifies a P&T system combined with a vertical barrier for implementation at N Springs. These systems comprise a component of overall cleanup of N Springs but were also intended to provide additional information to the ongoing CERCLA and RCRA processes. This ERA is not a final decision.
“Action Memorandum: Expedited Response Action Proposal; 100-BC-1 Demonstration Project; USDOE Hanford Site; Richland, Washington” (<u>EPA and Ecology 1995</u>)	Jun-95	ERA	Allows contaminated soil from 116-B-4, 116-B-5, and 116-C-1 to be excavated and temporarily stored pending start of ERDF operations; actions under this AM would provide additional information to support remedial design, including cost information, for 100-BC-1 OU. The ERA was not intended as a final decision; 100-BC-1 OU has been incorporated into an interim ROD and is undergoing a final ROD process.
“Action Memorandum, 183-H Solar Evaporation Basin Waste Expedited Response Action Cleanup Plan” (<u>CCN 040739</u>)	Nov-96	ERA	Identifies ERDF as the disposal location for 183-H Solar Evaporation Basin waste generated through cleanup activities.
“Action Memorandum, N Area Waste Expedited Response Action Cleanup Plan” (<u>CCN 038546</u>)	Nov-96	ERA	Identifies ERDF as the disposal location for contaminated sediment and debris from the Emergency Dump Basin, facility deactivation waste, and environmental investigation waste from the 100-N Area.
“Action Memorandum; 100-B/C Area Ancillary Facilities and the 108-F Building Removal Action, USDOE Hanford Site, Richland, WA” (<u>EPA 1997</u>)	Jan-97	NTCRA	Identifies D4 with ERDF disposal for facilities in 100-B and 100-F Areas: 111-B, 115-B, 118-C-4, 119-B, 105-C reactor waste, and 108-F Building. The B Reactor and ISS of 105-C Reactor are not included in the AM. This action is considered final for ancillary facilities and demolished portions of the reactor. Additional decisions are expected on the reactor core that is in ISS.
“Action Memorandum: Removal Action at the 233-S Plutonium Concentration Facility, USDOE Hanford Site, Benton County, WA” (<u>DOE and EPA 1997</u>)	Mar-97	NTCRA	Identifies D&D as the preferred alternative for 233-S and 233-SA Buildings, including subsurface systems and structures to a depth of 3 ft (further actions beyond the 3-ft depth would be deferred to the associated source OU). Waste meeting the criteria would be disposed at ERDF; other waste would be disposed as appropriate.
“Action Memorandum, USDOE Hanford 100 Area NPL, 100-IU-3 Operable Unit (Wahluke Slope), Hanford Site, Adams, Grant, and Franklin Counties, WA” (<u>Ecology and DOE 1997</u>)	Jul-97	TCRA	Addresses contaminated soils/drums at the 2,4-D Burial Ground in 200-IU-3 OU. Removal action includes excavating dioxin-contaminated soil for offsite disposal; bioremediation of 2,4-D contaminated soil; and excavating, cleaning, and disposing drums at ERDF. In the 1994 AM for Wahluke Slope, only 2,4-D Burial Ground was identified for sampling. Subsequently, additional contamination was found, prompting another AM. Completing this AM action allows continuation of the deletion process for the OU from the NPL.
“Action Memorandum: USDOE Hanford 100 Area National Priorities List, 105-F and 105-DR Reactor Buildings and Ancillary Facilities, Hanford Site, Benton County, WA” (<u>CCN 059689</u>)	Jul-98	NTCRA	Identifies ISS for 105-F and 105-DR reactor cores and D&D for reactor components up to the cores and for 116-D, 116-DR, 117-DR, and 119-DR ancillary facilities. Demolition will extend generally to 3 ft bgs; however, substructures and/or soil beneath the facilities that exceed cleanup levels will be excavated. This action is considered final for the ancillary facilities and demolished portions of reactors. Additional decisions are expected on the reactor cores in ISS.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
“Action Memorandum: USDOE Hanford 100 Area National Priorities List, 100-N Area Ancillary Facilities; Hanford Site, Benton County, WA” (DOE et al. 1998)	Dec-98	NTCRA	Provides for D&D of the inactive contaminated ancillary facilities in 100-N Area, facilities in the buffer zone, Hanford Generating Plant, and solid waste management units inside Hanford Generating Plant support facilities (D&D of 105-N and 109-N are excluded from the AM). Contaminated soils under the facilities would be addressed through 100-N Area decision documents for waste sites.
“Action Memorandum: USDOE, Hanford 300 Area National Priorities List (NPL), 331-A Virology Laboratory Building, Hanford Site, Benton County, WA” (DOE and EPA 2000)	Feb-00	NTCRA	Per the AM, the walls and floors of the 331-A Building would be demolished and the concrete slab would be scraped to remove physical hazards; wastes would be disposed at ERDF. The concrete slab and underlying soils would remain in place.
“Action Memorandum: USDOE Hanford 100 Area National Priorities List (NPL); 105-D and 105-H Reactor Facilities and Ancillary Facilities; Hanford Site; Benton County, WA” (DOE and Ecology 2000)	Dec-00	NTCRA	Identifies ISS for the 105-F and 105-DR reactor cores and D&D for the reactor components up to the cores and for the 116-D, 116-DR, 117-DR, and 119-DR ancillary facilities. Demolition will extend generally to 3 ft bgs; however, substructures and soil beneath the facilities that exceed cleanup levels will be excavated. This action is considered final for the ancillary facilities and demolished portions of the reactors. Additional decisions are expected on the reactor cores that are in ISS.
“Action Memorandum; USDOE, Hanford 100 Area National Priorities List, 105-B Reactor Facility, Hanford Site, Benton County, WA” (DOE and EPA 2001)	Dec-01	NTCRA	Identifies appropriate actions at B Reactor to mitigate the threat to site workers, public health or welfare or the environment by removing hazardous substances from the facility; these actions are consistent with increased public access to the reactor building; surveillance and maintenance activities would continue. Any wastes generated during the mitigation activities would be disposed at ERDF.
“Action Memorandum; 200 West Area, Central Waste Complex, 183-H Solar Evaporation Basin Waste, Hanford Site, Benton County, WA” (DOE et al. 2003)	Jun-03	NTCRA	Allows for the treatment and disposal to ERDF of wastes generated during the RCRA closure of 183-H basin.
“Action Memorandum; USDOE, 200 Area, Burial Ground 218-W-4C Waste Retrieval, Hanford Site, Benton County, WA” (DOE et al. 2004)	Apr-04	TCRA	Provides for the treatment and disposal of low-level and mixed low-level waste at ERDF from the M-091 TRU retrieval activities at the 218-W-4C Burial Ground. TRU is excluded from the AM.
“Action Memorandum: Request for Time Critical Response for Treatment and Disposal of Sludge from the 105-K East North Loadout Pit, USDOE Hanford Site” (DOE and EPA 2004)	Jun-04	TCRA	Requires treatment of 105-K East North Loadout Pit waste prior to temporary storage at Hanford and ultimate disposal at WIPP.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
“Action Memorandum for the Non-Time-Critical Removal Action for the 224-B Plutonium Concentration Facility” (DOE/RL-2004-36)	Jun-04	NTCRA	Provides for removing nonradiological and radiological hazardous substances from 224-B Facility, removing equipment and associated piping, decontaminating structure and stabilizing contamination, demolishing structure to slab, disposing waste generated, and stabilizing area. Samples will be used to determine the need for additional cleanup of the remaining slab and any subsurface soils. These cleanup actions are not included in the AM, but deferred to future activities.
“Comprehensive Environmental Response, Compensation and Liability Act Non-Time-Critical Removal Action Memorandum for Removal of the 232-Z Contaminated Waste Recovery Process Facility from the Plutonium Finishing Plant” (CCN 0093881)	Nov-04	NTCRA	Provides for the remaining contaminated equipment to be removed and the building decontaminated, stabilized, and dismantled leaving the building slab, which will be addressed under a future CERCLA action.
“Action Memorandum for the Non-Time-Critical Removal Action for the U Plant Ancillary Facilities” (DOE/RL-2004-67)	Dec-04	NTCRA	Provides for removing nonradiological and radiological hazardous substances from U Plant Ancillary Facilities, removing equipment/associated piping, decontaminating structures and stabilizing contamination, demolishing structures to slab, disposing the waste generated, and stabilizing the area around U Plant. The AM includes the specific facilities. Slabs and underlying soils will be addressed as needed through future CERCLA actions.
“Action Memorandum #1 for the 300 Area Facilities” (DOE and EPA 2005a)	Jan-05	NTCRA	Provides for D4 of 72 buildings/structures in the northern part of 300 Area, disposing D4 waste at ERDF. An additional 10 buildings/structures were included in the EE/CA that supports the AM; however, those buildings/structures were demolished and had no hazardous materials prior to the AM.
“Action Memorandum; USDOE, 100 Area, 105-N Reactor Facility and 109-N Heat Exchanger Building, Hanford Site, Benton County, WA” (DOE and Ecology 2005)	Mar-05	NTCRA	Provides for D&D of portions of 105-N and 109-N facilities and constructing a protective cover over the 105-N Reactor block, 109-N steam generator cells and pipe gallery, placing them into ISS, and waste generally disposed at ERDF. Final D&D of these facilities would be done in the future to allow decay of radionuclides in the reactor block. Identifies ISS as 64 years. This action is considered final for demolished portions of the reactor and heat exchange building. Additional decisions are expected on the reactor core and buildings in ISS.
“Action Memorandum for the Plutonium Finishing Plant, Above-Grade Structures Non-Time-Critical Removal Action” (DOE/RL-2005-13)	May-05	NTCRA	Provides for removing nonradiological and radiological hazardous substances from PFP above-grade structures, removing equipment/associated piping, decontaminating structures and stabilizing contamination, demolishing structures to slab, disposing the waste generated, and stabilizing and covering the area around PFP. Provides a listing of the specific structures. Slabs and underlying soils would be addressed as needed through future CERCLA actions.
“Action Memorandum for the Non-Time-Critical Removal Action for the 100-K Area Ancillary Facilities” (DOE and EPA 2005b)	Jun-05	NTCRA	Provides for D4 of 27 buildings/structures in northern part of 100-K Area with D4 waste going to ERDF. In general, slabs and subsurface structures would be removed with about 1 m of surrounding soil; however, on a case-by-case basis, the slabs, below-grade structures and soils can be deferred to CERCLA actions associated with 100-KR-1 and 100-KR-2 source OUs.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
“Action Memorandum for the Non-Time-Critical Removal Action for the 224-T Plutonium Concentration Facility” (DOE/RL-2004-68)	Jun-05	NTCRA	Provides for removing nonradiological and radiological hazardous substances from 224-T Facility, removing equipment/associated piping, decontaminating structure and stabilizing contamination, demolishing structure to slab, disposing the waste generated, and stabilizing the area. Samples will determine the need for additional cleanup of the remaining slab and any subsurface soils. These cleanup actions are not included in the AM, but deferred to future activities.
“Action Memorandum for the Time-Critical Removal Action for Support Activities to 200-UW-1 Operable Unit” (DOE/RL-2005-71)	Sep-05	TCRA	Provides activities to support U Canyon barrier construction, including removing part of the 200-W-42 pipeline, rerouting Treated Effluent Disposal Facility line and stabilizing/removing wastewater line; complete or partial removal of concrete slab; remove and seal 3 vent risers; and relocate various markers/utilities. The TCRA accelerated work consistent with weather conditions and to take advantage of available specialized resources. The action is not considered final; the decision process is ongoing for U Plant waste sites. The U Plant barrier ROD is considered final.
“Action Memorandum #2 for the 300 Area Facilities” (DOE and EPA 2006a)	May-06	NTCRA	Provides for D4 of the 324 and 327 Buildings and ancillary facilities in the 300 Area with D4 waste going to ERDF. The AM provides a list of the ancillary facilities. In general, slabs and subsurface structures would be removed along with about 1 m of surrounding soil; however, on a case-by-case basis, the slabs and/or below-grade structures and soils can be deferred to CERCLA actions associated with the 300-FF-2 OU.
“Action Memorandum #3 for the 300 Area Facilities” (DOE and EPA 2006b)	Nov-06	NTCRA	Provides for D4 of 110 buildings/structures in southern part of the 300 Area with D4 waste going to ERDF. An additional 30 buildings/structures were included in the EE/CA that supports the AM; however, those buildings/structures are not included in the AM because DOE identified alternative uses for them.
“Action Memorandum for the Non-Time-Critical Removal Action for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities” (DOE and EPA 2007)	Jan-07	NTCRA	Identifies ISS for 105-KE and 105-KW reactor cores, D&D of reactor components up to the cores and for remaining buildings and structures in 100-K Area. Subsurface structures will be removed 3 ft bgs; substructures and soil beneath facilities that exceed cleanup levels will be evaluated through source OU cleanup activities that are considered final for the ancillary facilities and demolished portions of the reactors. Further decisions are expected on reactor cores in ISS.
“Action Memorandum for the Non-Time-Critical Removal Action for the Northern Part of the BC Controlled Area (UPR-200-E-83) (DOE/RL-2008-21)	May-08	NTCRA	Provides removal, treatment as needed, and disposal, generally to ERDF, of UPR-200-E-83 Zone A soils to a depth of 6 in, or until PRGs are met, and Zone B soils in areas of elevated radioactivity above PRGs. Excavation activities must consider old growth vegetation, avoiding destruction of existing plant life.
“Action Memorandum for the Non-Time-Critical Removal Action for the 212-N, -P and -R Facilities” (DOE/RL-2008-80)	May-09	NTCRA	Provides for removing nonradiological and radiological hazardous substances from 212-N, -P, and -R facilities equipment and associated piping; decontaminating structures, stabilizing contamination, demolishing basins and underlying soils to 1 m depth, disposing waste generated, and stabilizing surrounding area. Samples will be collected from underlying soils to evaluate the need for additional cleanup activities.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
“Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit” (DOE/RL-2009-48)	Jul-09	NTCRA	Provides for cleanup of 11 waste sites in the 100-MG-1 OU using either a confirmatory sampling/no further action alternative (8 sites) or RTD alternative (3 sites). Cleanup levels will be consistent with existing 100 Area cleanup levels. If confirmatory sites do not meet cleanup levels, they will be addressed by the RTD alternative.
“Investigation-Derived Waste Purgewater Management Action Memorandum” (DOE/RL-2009-39)	Aug-09	NTCRA	Provides for additional purge water management capacity by relining an existing unit and installing up to 3 new units, each with leak-detection systems. The purge water management units will be operated according to requirements, monitored during operations, and disassembled and dispositioned to appropriate requirements following the operational period.
“Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit” (DOE/RL-2009-37)	Oct-09	NTCRA	Provides for cleanup of 34 waste sites in the 100-MG-2 OU using a confirmatory sampling/no further action alternative (16 sites) or an RTD alternative (18 sites). If the confirmatory sites do not meet cleanup levels, they will be addressed by the RTD alternative. The remaining 200-MG-2 OU sites are not included because contamination may exceed 15 ft bgs; they will be addressed through the CERCLA remedial process.
“Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit” (DOE/RL-2009-86)	Apr-10	NTCRA	Provides for cleanup of 37 waste sites in 100-MG-1 OU using a confirmatory sampling/no further action alternative (21 sites) or RTD alternative (16 sites). Cleanup levels will be consistent with existing 100 Area cleanup levels. If confirmatory sites do not meet cleanup levels, they will be addressed by the RTD alternative. Remaining 200-MG-1 OU sites are not included because contamination may exceed 15 ft bgs; they will be addressed through the CERCLA remedial process.
“Action Memorandum for General Hanford Site Decommissioning Activities” (DOE/RL-2010-22)	Apr-10	NTCRA	Establishes D4 for excess industrial buildings/structures and cleanup of various debris; provides for removing contaminated soil or evaluating contaminated soils for inclusion as a waste site through WIDS; identifies ERDF as the preferred location for wastes meeting ERDF disposal criteria; allows the possibility of using certain wastes in other remedial actions, such as fill material under barriers; and for incorporating additional, similar buildings and structures in the AM.
“Action Memorandum for the Non-Time-Critical Removal Action for the 212-N, 212-P, and 212-R Facilities, Addendum 1: Disposition of Railcars” (DOE/RL-2008-80-ADD1)	Dec-10	NTCRA	Provides for D4 of 16 railcars located in 200 North Area with disposal to ERDF and includes an option to evaluate some of the cars for movement to the B Reactor for preservation. The AM identifies a pathway for addressing contaminated soils either by removal at the time of D4 or transfer to another OU for continued CERCLA action.
“Action Memorandum for Decontamination, Deactivation, Decommissioning, and Demolition (D4) Activities for 200 East Tier 2 Buildings/Structures” (DOE/RL-2010-102)	Feb-11	NTCRA	Established D4 to slab-on-grade for 57 Tier 2 buildings / structures in 200 East Area; plug or grout below-grade piping and drains; remove equipment; remove and fill below-grade voids; send waste to ERDF or other approved facility for treatment and disposal; characterize nature and extent of remaining hazardous substances for future decisions; initiate waste site evaluation through WIDS for sites that may require further work; stabilize area as needed.

Table A-2. CERCLA Action Memoranda. (7 pages)

Title	Date	Action	Removal Action/Decision
AM	=	Action Memorandum.	OU = operable unit.
bgs	=	below ground surface.	P&T = pump-and-treat.
CCN	=	correspondence control number.	PFP = Plutonium Finishing Plant.
CERCLA	=	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i>	PRG = preliminary remediation goal.
D4	=	deactivate, decontaminate, decommission, and demolish.	RCRA = <i>Resource Conservation and Recovery Act of 1976.</i>
D&D	=	decontamination and decommission.	ROD = record of decision.
EE/CA	=	engineering evaluation/cost analysis.	RTD = remove, treat, and dispose.
ERA	=	expedited response action.	TCRA = time critical removal action.
ERDF	=	Environmental Restoration Disposal Facility.	TRU = transuranic.
ISS	=	interim safe storage.	WIDS = Waste Information Data System.
NTCRA	=	non-time-critical removal action.	WIPP = Waste Isolation Pilot Plant.

Table A-3. Permits, Licenses, and Other Statutory/Regulatory Program Decisions Affecting Hanford Cleanup. (3 pages)

Document	Summary
<p><i>Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste (WA7890008967).</i></p> <p>FINAL</p> <p>Ecology issued a Draft Hanford Facility Dangerous Waste Permit, Rev. 9, for public review and comment from May 1, 2012, through October 22, 2012. Until Ecology reaches a final decision, Rev. 8C Permit remains in effect.</p>	<p>This dangerous waste permit, for the TSD of dangerous waste at Hanford, is the RCRA Permit for the Hanford Facility. The permit allows a step-wise permitting process to ensure the proper implementation of the TPA. In order to accomplish this, the permit consists of six parts:</p> <ul style="list-style-type: none"> • Part I, Standard Conditions • Part II, General Facility Conditions • Part III, Unit-Specific Conditions for Final Status Operations • Part IV, Unit-Specific Conditions for Corrective Action • Part V, Unit-Specific Conditions for Units Undergoing Closure • Part VI, Unit-Specific Conditions for Units in Post-Closure.
<p>Prevention of Significant Deterioration Permit No. PSD-X80-14, issued to RL by the EPA, Region 10.</p> <p>FINAL</p>	<p>Covers emission of NO_x to the atmosphere from the Plutonium Uranium Extraction Plant and the Uranium-Trioxide Plant. No expiration date.</p>
<p>Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington (58 FR 48509)</p> <p>FINAL</p>	<p>In December 1992, DOE issued the <i>Final Environmental Impact Statement on Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, WA (DOE/EIS-0119F)</i>. The final EIS analyzed alternatives for decommissioning eight water-cooled, graphite-moderated plutonium-production reactors located along the Columbia River. The eight reactors (B, C, D, DR, F, H, KE and KW) operated between 1944 and 1971 and are retired from service. The alternatives analyzed in the EIS included no action, immediate one-piece removal, safe storage followed by deferred one-piece removal, safe storage followed by deferred dismantlement, and in situ decommissioning alternatives. The ROD was signed September 10, 1993 (58 FR 48509). The ROD documented the DOE decision for safe storage followed by deferred one-piece removal of the eight surplus reactors. DOE prepared a supplemental analysis to the EIS in July 2010 (<i>Supplement Analysis, Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington [DOE/EIS-0119F-SA-01]</i>) to broaden the possible decommissioning approach, retaining the one-piece removal option and including the option for immediate dismantlement. DOE determined that the proposed action is not a substantial change to the alternatives previously analyzed in the EIS so a supplement to DOE/EIS-0119F or new EIS is not needed.</p>

Table A-3. Permits, Licenses, and Other Statutory/Regulatory Program Decisions Affecting Hanford Cleanup.
(3 pages)

Document	Summary
Record of Decision: Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (78 FR 75913) FINAL	In December 2013, DOE issued the first in a series of RODs pursuant to the <i>Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington</i> (TC&WM EIS, DOE/EIS-0391, December 2012). In this ROD DOE announced several decisions, including: to implement Tank Closure Alternative 2B, “Expanded WTP Vitrification and Landfill Closure,” without supplemental treatment at WTP and without technetium-99 removal in the WTP Pretreatment facility; to implement FFTF Alternative 2 Entombment; and, to implement Waste Management Alternative 2.
Hanford Site Air Operating Permit 00-05-006, Renewal 2 FINAL	Covers operations on the Hanford Site having a potential to emit airborne emissions. The permit provides a compilation of applicable <i>Clean Air Act of 1977</i> (42 USC 7401) requirements for radioactive and nonradioactive emissions at Hanford. It will be implemented through Federal and State programs. Effective April 1, 2013 through March 31, 2018. Attachment 1 contains Ecology’s permit terms and conditions. Attachment 2 contains the State of Washington Department of Health Radioactive Air Emissions License (FF-01) as permit terms and conditions. Attachment 3 contains the Benton Clean Air Agency permit terms and conditions applicable to the regulations of open burning and asbestos.
Permit WA-002591-7, Clean Water Act of 1977 – National Pollutant Discharge Elimination System Permit FINAL	Authorizes discharge of water from 100 Area facilities to the Columbia River from Outfall 004 in accordance with discharge point, effluent limitations, monitoring requirements and other conditions. Effective December 1, 2009 through July 31, 2014.
Permit WAR10B90F, Clean Water Act of 1977 – National Pollutant Discharge Elimination System General Permit FINAL	Authorizes storm water discharges associated with construction activities from the Hanford Site to the Columbia River in accordance with a Storm Water Pollution Prevention Plan. No expiration date is specified; the estimated project completion date identified in the most recent Notice of Intent is May 27, 2014.
Permit CR-IU005, Clean Water Act of 1977 – National Pollutant Discharge Elimination System Permit FINAL	Allows wastewater from the Environmental Molecular Sciences Laboratory to be discharged to the city of Richland’s wastewater treatment facility.
Permit ST-4500, Washington State Department of Ecology – State Wastewater Permit FINAL	Allows treated wastewater from the Effluent Treatment Facility to be discharged to the State-Approved Land Disposal Site. This permit expired August 1, 2005, and has not been reissued. The old permit will remain in effect until the new permit is issued.
Permit ST-0004502, Washington State Department of Ecology – State Wastewater Permit FINAL	Allows treated effluent from the 200 East and 200 West Areas to be discharged to the 200 Area Treated Effluent Disposal Facility. This permit revised and replaced Permit ST-4502 and will remain in effect from July 1, 2012 to June 30, 2017.
Permit ST-4511, Washington State Department of Ecology – State Wastewater Permit FINAL	Consolidation of permits: ST-4501, ST-4508, ST-4509, and ST-4510. This Categorical State Waste Discharge Permit authorizes the discharge of wastewater from maintenance, construction, and hydrotesting activities and allows for cooling water, condensate, and industrial storm water discharges at the Hanford Site. This permit was issued February 16, 2005 and was set to expire February 16, 2010. A renewal application was submitted to Ecology in August 2009, and a supplemental request was submitted in April 2010 to incorporate Permit ST-4501 as well. This permit will remain in effect until the new permit is issued.
Permit ST0045514, Washington State Department of Ecology – State Wastewater Permit FINAL	Allows domestic wastewater to be treated in a non-discharging, lined evaporative lagoon located northeast of the 200 West Area. Effective July 1, 2012 through June 30, 2017.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
<p><i>Federal Facilities Compliance Act of 1992.</i> FINAL</p>	<p>This act amended RCRA, Section 6961 and other sections and requires DOE to prepare plans that develop treatment capacity for mixed waste stored or generated at each facility, except for those facilities subject to a permit that establishes a schedule for treatment of such waste or an existing agreement or order governing the treatment of such waste to which the State is a party. The host state and/or EPA must approve each plan. Washington State, EPA, and DOE had the TPA, which addressed compliance with the storage prohibition for mixed waste at the time this law was enacted and was not required to develop a new plan. A violation of the TPA may concurrently be a violation of the <i>Federal Facilities Compliance Act of 1992</i> (i.e., Washington State may seek judicial enforcement under RCRA (42 USC 6901)).</p>
<p><i>Nuclear Waste Policy Act of 1982 (42 USC 10101).</i> FINAL</p>	<p>This act directed DOE to characterize and evaluate the Yucca Mountain site for suitability as a potential repository for disposal of commercial SNF and HLW. The act directed the President to evaluate the need for a separate repository for HLW resulting from atomic energy defense activities. On April 30, 1985, President Reagan completed this evaluation. The result was that HLW from atomic energy defense activities may be disposed in the proposed repository along with SNF. After passage by the U.S. House of Representatives and U.S. Senate, on July 23, 2002, President Bush signed House Joint Resolution 87 approving the site at Yucca Mountain for developing a repository for disposal of HLW and SNF, pursuant to the <i>Nuclear Waste Policy Act of 1982</i>.</p> <p>As indicated in the Obama Administration's FY 2010 budget request, the Administration intends to terminate the Yucca Mountain program while developing nuclear waste disposal alternatives. Notwithstanding the decision to terminate the Yucca Mountain program, DOE remains committed to meeting its obligations to manage and dispose of HLW and SNF. The Administration directed establishing the Blue Ribbon Commission on America's Nuclear Future (Commission) to evaluate alternative approaches for meeting these obligations. The Commission submitted its final report to the Secretary of Energy in January 2012. The Commission did not evaluate Yucca Mountain or any other location and recommended a waste management approach to resolve the current impasse, which has eight key elements:</p> <ol style="list-style-type: none"> 1. A new consent-based approach to siting future nuclear waste management facilities. 2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed. 3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management. 4. Prompt efforts to develop one or more geologic disposal facilities. 5. Prompt efforts to develop one or more consolidated storage facilities. 6. Prompt efforts to prepare for eventual large-scale transport of SNF and HLW to consolidated storage/disposal facilities when such facilities become available. 7. Support continued U.S. innovation in nuclear energy technology and workforce development. 8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns. <p>In January 2013, DOE responded to the Blue Ribbon Commission's final report in the <i>Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste</i>. This policy document proposes a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of SNF and HLW from civilian nuclear power generation, defense, national security and other activities.</p>

Table A-3. Permits, Licenses, and Other Statutory/Regulatory Program Decisions Affecting Hanford Cleanup.
(3 pages)

Document	Summary
Permit WAG-50-5180, Washington State Department of Ecology – State Sand and Gravel General Permit FINAL	Permit for wastewater discharges associated with handling sand and gravel for the Concrete Batch Plant in the 200 East Area. Effective October 1, 2010 through October 1, 2015.
Permit WAG-50-5181, Washington State Department of Ecology – State Sand and Gravel General Permit FINAL	Permit for wastewater discharges associated with Pit 30 Quarry operations in the 200 East Area. Effective October 1, 2010 through October 1, 2015.
Large Onsite Sewage Systems (LOSS) “Permit to Operate” HAN099 FINAL	Lists systems in the various areas.
Underground Injection Control (UIC) Wells	Hanford has a number of UIC wells – storm water, non-storm water and septic systems. The Mission Support Contractor maintains the inventory and locations of active and inactive wells.

Table A-4. Tri-Party Agreement Decisions Affecting Hanford Cleanup.

TPA Documentation	Summary of Decision
<ul style="list-style-type: none"> • M-045-00 • Appendix C Part 1: Required Retrieval Technologies • Appendix H 	Closure will follow retrieval of as much tank waste as technically possible, with tank waste residues not to exceed 360 ft ³ in each of the 100-series tanks, 30 ft ³ in each of the 200-series tanks, or the limit of waste retrieval technology capability.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
Executive Order 11514, <i>Protection and Enhancement of Environmental Quality</i> , as amended by <u>Executive Order 11991</u>	This order requires Federal agencies to continually monitor and control their activities to protect and enhance the quality of the environment and develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs that may have potential environmental impacts so that interested parties can submit their views. DOE issued regulations <u>10 CFR 1021</u> , “National Environmental Policy Act Implementing Procedures” and <u>DOE O 451.1B</u> , <i>National Environmental Policy Act Compliance Program</i> for compliance with this order.
<u>Executive Order 12088</u> , <i>Federal Compliance with Pollution Control Standards</i>	This order directs Federal agencies to comply with applicable administrative and procedural pollution control standards established by, but not limited to: <i>Clean Air Act of 1977</i> (42 USC 7401); <i>Noise Control Act of 1972</i> (42 USC 4901); <i>Clean Water Act of 1977</i> (33 USC 1251); <i>Safe Drinking Water Act of 1974</i> (42 USC 300); <i>Toxic Substances Control Act of 1976</i> (15 USC 2601); and RCRA (42 USC 6901).
<u>Executive Order 12580</u> , <i>Superfund Implementation</i>	This order delegates a number of Federal departments and agencies the authority and responsibility to implement certain provisions of CERCLA. Policies and procedures for implementing these provisions (e.g., response actions and fulfilling natural resource trusteeship responsibilities) are provided in the National Contingency Plan.

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
<p><i>Waste Isolation Pilot Plant Land Withdrawal Act</i> (Public Law 102-579). <u>FINAL</u></p>	<p>The act withdrew land from the public domain for purposes of creating and operating WIPP, the geologic repository in New Mexico designated as the national disposal site for defense TRU waste. In addition to establishing the location for the facility, the WIPP Land Withdrawal Act defines the characteristics and amount of waste that will be disposed at the facility. Amendments to the WIPP Land Withdrawal Act exempt waste designated by the Secretary of Energy for disposal at WIPP from the RCRA land disposal restrictions. However, these amendments do not exempt mixed TRU waste from other RCRA requirements. WIPP does have a RCRA permit and can accept mixed TRU waste. On May 15, 2003, EPA Region 6 approved DOE's request to dispose TRU and mixed TRU waste containing PCBs at WIPP subject to certain "conditions of approval."</p>
<p><u>Spent Fuel Settlement Agreement</u> (No. CV-91-0035-S-EJL and No. CV-91-0054-S-EJL), October 17, 1995 Consent Decree for Stabilization of SSTs at Hanford Site between U.S. Department of Energy and Washington State Department of Ecology (No. CT-99-5076-EFS) September 29, 1999. <u>FINAL</u></p>	<p>This agreement allows INL to receive SNF and mixed waste from offsite and establishes schedules for the treatment of existing HLW, TRU waste, mixed waste, and removal of SNF from the State.</p> <p>This consent decree established a court-enforceable, technically sound schedule for pumping liquid nuclear waste from the remaining 29 unstabilized SSTs. The key elements of the consent decree included:</p> <ul style="list-style-type: none"> • Pumping the tanks that pose the greatest environmental risk first, thus providing additional protection for the Columbia River and public health. • Accelerating the schedule for pumping so that 98% of approximately 6.2 million gallons of remaining pumpable liquid is removed by September 30, 2003, with the final 2% scheduled to be removed by September 30, 2004 (this was completed). • Increasing DOE funding to a level that supports successful execution of the new schedule for tank stabilization. • Work under the consent decree has been completed and the court has terminated the consent decree.
<p><u>Presidential Proclamation 7319, Establishment of the Hanford Reach National Monument</u> (June 9, 2000). <u>FINAL</u></p>	<p>This proclamation set apart and reserved the Hanford Reach National Monument to protect all lands and interests in lands owned or controlled by the U.S. within the boundaries of the monument area. The lands reserved consist of approximately 195,000 acres, and are appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws. The monument is to be managed by the U.S. Fish and Wildlife Service under existing agreements with DOE. DOE retains its responsibilities under applicable environmental laws, including the remediation of hazardous substances or the restoration of natural resources at the Hanford Site.</p>
<p><u>Executive Order 13175, Consultation and Coordination with Indian Tribal Governments</u> (November 6, 2000). <u>FINAL</u></p>	<p>This order supplements "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), and states that each executive department and agency shall consult, to the greatest extent practicable and to the extent permitted by law, with Tribal Nations prior to taking actions that affect Federally recognized tribal governments. This order also states that each executive department and agency shall assess the impact of Federal government plans, projects, programs, and activities on tribal trust resources and ensure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities.</p>
<p>U.S. Department of Interior Announcement, National Historic Landmark, August 19, 2008.</p>	<p>Hanford's B Reactor, has been designated a National Historic Landmark by the U.S. Department of Interior. Since then, efforts have continued to include B Reactor in a new National Historical Park.</p>
<p>2015 National Defense Authorization Act</p>	<p>President Obama signed the 2015 National Defense Authorization Act into law on December 19, 2014, authorizing the Manhattan Project National Historical Park. B Reactor as the world's first production reactor is a signature facility of the Manhattan Project National Historical Park.</p>

Table A-5. Other Federal and State Decisions Affecting Hanford Site Cleanup. (4 pages)

Other Federal/State Decision	Summary of Decision
Consent Decree in <i>State of Washington v. Department of Energy</i> , Case No. <u>CV-08-5085-FVS</u> (E.D. Wa. October 25, 2010)	The Consent Decree imposes milestones for the construction, commissioning, and startup of the WTP, as well as continued retrieval of waste from Hanford's SSTs. Significant milestones in the Consent Decree require DOE to meet deadlines for the WTP's facilities to keep construction on pace; start treating tank waste through the WTP by 2019; achieve initial plant operations by 2022; retrieve the waste from the remaining 10 tanks in the "C" tank farm by 2014; identify nine other SSTs to retrieve waste from by 2014; and finish retrieving the waste from those nine other tanks by 2022. The Consent Decree also covers reporting requirements for waste retrievals from SSTs, regulatory coordination, and a process to resolve disputes between the agencies.
Settlement Agreement between the State of Washington and the U.S. Department of Energy (No. 2: 03CV-05018-AAM January 6, 2006). <u>FINAL</u>	Prior to the issuance of the <i>Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington</i> (HSW EIS) (DOE/EIS-0286F) and record of decision (69 FR 39449, "Record of Decision for the Solid Waste Program, Hanford Site, Richland, WA: Storage and Treatment of Low-Level Waste and Mixed Low-Level Waste; Disposal of Low-Level Waste and Mixed Low-Level Waste, and Storage, Processing, and Certification of Transuranic Waste for Shipment to the Waste Isolation Pilot Plant"), the State initiated litigation on issues related to the importation, treatment, and disposal of radioactive and hazardous waste generated off the Hanford Site as a result of nuclear defense and research activities. The court enjoined shipment of offsite TRU waste to Hanford for processing and storage pending shipment to WIPP located near Carlsbad, New Mexico. DOE, the State, and the U.S. Department of Justice signed a Settlement Agreement ending the litigation on January 6, 2006. The agreement is intended to resolve the State's concerns about HSW EIS (DOE/EIS-0286F) groundwater and other analyses. The agreement specifies that when the <i>Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington</i> (DOE/EIS-0391) is complete, it will supersede the HSW EIS. Until that time, DOE will not rely on HSW EIS groundwater analyses for decision-making and will not import offsite waste to Hanford with certain limited exemptions as specified in the agreement.
CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i> . DOE = U.S. Department of Energy. EPA = U.S. Environmental Protection Agency. HLW = high-level waste. HSW EIS = <i>Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington</i> .	INL = Idaho National Laboratory. PCB = polychlorinated biphenyl. RCRA = <i>Resource Conservation and Recovery Act of 1976</i> . SNF = spent nuclear fuel. SST = single-shell tank. TPA = Tri-Party Agreement. TRU = transuranic. WIPP = Waste Isolation Pilot Plant. WTP = Waste Treatment Plant.

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- EPA/ROD/R10-96/143, 1996, *Declaration of the Record of Decision for the 300-FF-1 and 300-FF-5 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-96/151, 1996, *Declaration of the Record of Decision for the 100-IU-1, 100-IU-3, 100-IU-4, and 100-IU-5 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-97/048, 1997, *Declaration of the Record of Decision, USDOE Hanford 200 Area, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-99/039, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-99/059, 1999, *Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-99/112, 1999, *Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-00/120, 2000, *Interim Remedial Action Record of Decision Declaration, U.S. Department of Energy 100 Area, 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-00/121, 2000, *Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2 and the 100-KR-2 Operable Units*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-01/119, 2001, *Declaration of the Interim Record of Decision for the 300-FF-2 Operable Unit*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.

Executive Order 11514, 1970, *Protection and Enhancement of Environmental Quality*, Richard M. Nixon, March 5. Sec. 2 amended by Executive Order 11991 of May 24, 1977, 42 FR 26967, 3 CFR, 1977 Comp., p. 123.

Executive Order 11991, 1977, *Relating to Protection and Enhancement of Environmental Quality*, Jimmy Carter, May 24, 1977, 42 FR 26967.

Executive Order 12088, 1978, *Federal Compliance with Pollution Control Standards*, James E. Carter, October 13. Sec. 1-8 amended by Executive Order 12580 of Jan. 23, 1987, 52 FR 2923, 3 CFR, 1987 Comp., p. 193.

Executive Order 12580, 1987, *Superfund Implementation*, 52 FR 2923, 3 CFR, 1987 Comp., p. 193.

Executive Order 13175, 2000, *Consultation and Coordination with Indian Tribal Governments*, William J. Clinton, November 6.

Federal Facilities Compliance Act of 1992, Public Law 102-386, October 6, 1992, 106 Stat. 1505.

Hazardous and Solid Waste Amendments of 1984, Public Law 98-616, November 8, 1984, 98 Stat. 3221.

Noise Control Act of 1972, 42 USC 4901, et seq.

Nuclear Waste Policy Act of 1982, 42 USC 10101, et seq.

Presidential Proclamation 7319, 2000, *Establishment of the Hanford Reach National Monument*, William J. Clinton, June 9.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

Safe Drinking Water Act of 1974, 42 USC 300, et seq.

Spent Fuel Settlement Agreement between the State of Idaho and U.S. Department of Energy, order signed October 16, 1995, in *Public Service Co. of Colorado v. Batt* (CV-91-0035-S-EJL) and *United States V. Batt* (CV-91-0054-S-EJL).

Superfund Amendments and Reauthorization Act of 1986, 42 USC 103, et seq.

Toxic Substances Control Act of 1976, 15 USC 2601, et seq.

WA7890008967, 2013, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*, Washington State Department of Ecology, Nuclear Waste Program, Richland, Washington, September 30.

Waste Isolation Pilot Plant Land Withdrawal Act, 1992, Public Law 102-579, October 30, 106 Stat.4777.

APPENDIX B

FUTURE CLEANUP ACTIONS AND ALTERNATIVE ANALYSES

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TERMS

ABAR	aggregate barrier
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CSNA	confirmatory sampling to support no further cleanup action
D&D	decontamination and decommission
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESD	explanation of significant differences
ETF	Effluent Treatment Facility
FBSR	fluidized bed steam reforming
FFTF	Fast Flux Test Facility
HLW	high-level waste
IBAR	individual barrier
IC	institutional controls
IDF	Integrated Disposal Facility
ILAW	immobilized low-activity waste
INL	Idaho National Laboratory
ISS	interim safe storage
LAW	low-activity waste
LCR	Lifecycle Report
LERF	Liquid Effluent Retention Facility
LTS	long-term stewardship
MESC	maintain existing soil cover
MNA	monitored natural attenuation
N/A	not applicable
NEPA	<i>National Environmental Policy Act of 1969</i>
NRDWL	Nonradioactive Dangerous Waste Landfill
OU	operable unit
P&T	pump-and-treat
PFP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction (Plant)
RAO	remedial action objective
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
REDOX	Reduction-Oxidation Facility (S Plant)
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RTD	remove, treat, and dispose
SALDS	State-Approved Land Disposal Site
S&M	surveillance and maintenance
SSE	safe storage enclosure
SST	single-shell tank
SWL	solid waste landfill

TBD	to be determined
TC&WM EIS	Tank Closure and Waste Management Environmental Impact Statement
TPA	Tri-Party Agreement
TRU	transuranic
TSD	treatment, storage, and disposal
WAC	<i>Washington Administrative Code</i>
WESF	Waste Encapsulation and Storage Facility
WRAP	Waste Receiving and Processing Plant
WTP	Waste Treatment and Immobilization Plant

APPENDIX B

FUTURE CLEANUP ACTIONS AND ALTERNATIVE ANALYSES

In accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), commonly referred to as the Tri-Party Agreement (TPA) M-036-01 requires that where final cleanup decisions have not yet been made, the *Hanford Lifecycle Scope, Schedule and Cost Report* (Lifecycle Report [LCR]) may consider ranges of alternatives and present a reasonable upper bound:

“In circumstances where final cleanup decisions have not yet been made, the report shall be based upon the reasonable upper bound of the range of plausible alternatives or may set forth a range of alternative costs including such a reasonable upper bound.”

The TPA milestone specifies that when making assumptions (e.g., about alternative cleanup actions), the U.S. Department of Energy (DOE) is to take into account the views of the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology), as well as the values expressed by affected Tribal Governments and Hanford stakeholders.

Cleanup decisions are made so that DOE can implement future cleanup actions at the Hanford Site. As discussed in Section B.1, the LCR has grouped remaining Hanford Site cleanup work into approximately 36 separate cleanup actions.

Because final cleanup decisions have not yet been made for many of the remaining Hanford cleanup work, the LCR may consider the range of plausible alternatives (or alternative costs) and present a reasonable upper bound. DOE has decided that information about the range of plausible alternatives, rather than just a range of alternative costs, would be most useful for this LCR. DOE also believes that in most cases, cost estimates include allowances for uncertainties in current planning that encompass a wide range of potential alternatives. Section B.2 includes information about the range of plausible alternatives for each future cleanup action.

Because many final decisions remain to be made, a reasonable upper bound will need to be defined, along with schedule and costs, for a number of remaining cleanup actions. To give each action a sufficient level of analysis and detail, DOE has decided to take a methodical and planned approach to developing in-depth analyses of cleanup action alternatives, including definition of reasonable upper bound schedules and costs.

Section B.3 proposes a rationale and schedule for when different cleanup actions may undergo in-depth alternatives analyses in the LCR.

Information provided in this appendix has been developed for the sole purpose of preparing the LCR and fulfilling the requirements of TPA M-036-01; the LCR is not a decision-making document. Cleanup actions and decisions discussed in this appendix are still undergoing formal development, review, and eventual approval pursuant to procedures established in the TPA and applicable Federal and State requirements. Information in this appendix does not presume nor is it intended to prejudice the outcome of the requirements that must be followed by the Tri-Party agencies (DOE, Ecology, and EPA). Any errors or discrepancies in this appendix will be superseded by the results of the legally applicable decision-making processes.

B.1 IDENTIFYING FUTURE CLEANUP ACTIONS FOR THE HANFORD SITE

The term “cleanup action” is used to conceptually describe work that enables cleanup to proceed for common or related contaminants that occur in a relatively well-defined environmental media (or waste management system) within a generally contiguous geographic area.

This cleanup action concept is consistent with the operable unit (OU) cleanup approach taken in the TPA and enables future cleanup actions and alternatives to be addressed in a manner consistent with the way cleanup decisions are being made for Hanford. This approach also provides a reasonable middle ground for looking at cleanup work that is performed onsite.

The Tri-Party agencies developed a set of cleanup actions for the LCR. Table B-1 lists the future cleanup actions for which final cleanup decisions do not yet exist.

Table B-1. Future Cleanup Actions for which Final Decisions Have Not Been Made.

River Corridor Cleanup Actions			
<ul style="list-style-type: none"> • Disposition N Reactor • Disposition 100 Area K West Basin • Remediate 100 Area Contaminated Soil Sites • Restore 100-BC-5 Groundwater OU to Beneficial Use • Restore 100-KR-4 Groundwater OU to Beneficial Use • Restore 100-NR-2 Groundwater OU to Beneficial Use • Restore 100-HR-3 Groundwater OU to Beneficial Use • Disposition 300 Area Facilities Retained by Pacific Northwest National Laboratory • Disposition of 100 Area former Orchard Contaminated Soil Sites (100-OL-1 OU) 			
Central Plateau Cleanup Actions			
<ul style="list-style-type: none"> • Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU) • Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 OUs) • Disposition Below-Grade Portions of Plutonium Finishing Plant • Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU) • Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU) • Disposition PUREX Storage Tunnels (200-CP-1 OU) • Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU) • Disposition T Plant Canyon Building/Associated Waste Sites • Disposition Cesium/Strontium Capsules • Remediate 200-SW-1 OU • Disposition Remaining Liquid Waste Disposal Facilities • Disposition Remaining Waste Treatment, Storage, and Disposal Facilities • Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks (200-IS-1 OU) • Remediate Land Disposal Units (200-SW-2 OU) • Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU) • Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU) • Disposition Fast Flux Test Facility Complex • Disposition Remaining Buildings and Facilities Within Fast Flux Test Facility Complex • Disposition Remaining Inner Area Buildings and Facilities • Remediate Contaminated Deep Vadose Zone (200-DV-1 OU) • Restore 200 West Groundwater to Beneficial Use (200-UP-1 OU) • Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 OUs) 			
Tank Waste Cleanup Actions			
<ul style="list-style-type: none"> • Tank Retrieval and Single-Shell Tank Farm Closure • Tank Waste Treatment • Secondary Waste Treatment • Double-Shell Tank Closure • Waste Treatment and Immobilization Plant Closure 			
OU	=	operable unit.	REDOX = Reduction-Oxidation Facility (S Plant).
PUREX	=	Plutonium Uranium Extraction (Plant).	

Cleanup work at Hanford can be complex and extend over long periods. Frequently, interim decisions are made and incremental cleanup steps are taken, followed by improved decisions as more is learned and other, better alternatives become available. Even relatively simple cleanup actions can encompass many sequenced activities and a substantial amount of work lasting several years. Thus, many of the cleanup actions discussed in the LCR will evolve over time and may have a different scope in future reports as progress is made in completing Hanford cleanup.

B.2 IDENTIFYING RANGES OF PLAUSIBLE ALTERNATIVES AND ANALYZING ALTERNATIVES FOR FUTURE CLEANUP ACTIONS

The LCR provides information about ranges of plausible alternatives for future cleanup actions. Alternatives are included based on current understandings among the Tri-Party agencies, the status of existing and forthcoming cleanup decisions, and whether current planning adequately encompasses the range of plausible alternatives. The Tri-Party agencies developed and maintain the range of plausible alternatives presented in Section B.2.1.

As discussed further in Section B.2.2, a more in-depth analyses of the alternatives for individual future cleanup actions will be performed in order to describe a reasonable upper bound for the scope and costs of a specific cleanup action. The Tri-Party agencies have agreed to take a graded approach and to analyze alternatives and develop a reasonable upper bound scope and cost estimate as a sensitivity analysis for a limited set of future cleanup actions in each annual LCR. The main reasons for this approach include the following:

- Developing and analyzing alternatives for every separate cleanup action in every annual edition of the LCR would be resource intensive and inefficient
- Final cleanup decisions are expected soon for a number of cleanup actions, and the decision process will produce thorough and detailed analyses of potential alternatives
- Many interim cleanup actions are underway, the results of which will improve the ability to analyze alternatives in future LCRs.

In lieu of analyzing alternatives for all cleanup actions every year, the LCR proposes a schedule and rationale for when different cleanup actions will undergo in-depth analyses. Section B.3 provides this information.

B.2.1 RANGE OF PLAUSIBLE ALTERNATIVES

The range of plausible alternatives for each future cleanup action was originally developed through a series of working sessions involving the Tri-Party agencies' subject matter experts applying their knowledge of Hanford Site cleanup work and best professional judgment. Each range of plausible alternatives, in the opinion of the agency experts, has alternatives that include a maximum cleanup effort (e.g., a likely upper bound) for that cleanup action. In addition, the ranges of plausible alternatives exclude alternatives that could not be part of a reasonable upper bound (e.g., no action). Determining the range of plausible alternatives and likely upper bounding cleanup effort took into account, among other factors, current requirements under the TPA and other environmental obligations, and the status of alternatives being considered under existing and forthcoming cleanup decisions. The range of plausible alternatives for each cleanup action was intended to encompass the most current planning assumptions with respect to that cleanup action. This list is updated by the Tri-Party agencies annually.

Tables B-2, B-3, and B-4 list and are organized by the identified future cleanup actions for River Corridor, Central Plateau, and Tank Waste. These tables include the following:

- For each cleanup action, a summary of the current cleanup decisions that have been made pursuant to the TPA and other environmental obligations, and a list of relevant cleanup decision documents
- For each cleanup action, a list that encompasses the likely range of plausible alternatives.

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

CLEANUP ACTION:	RC-1a ¹ River Corridor – Disposition N Reactor
Cleanup Decision Summary and Relevant Decision Documents In September 1993, DOE issued 58 FR 48509, “Record of Decision: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, WA,” which implements the recommendation for safe storage followed by deferred one-piece removal of the surplus reactors. N Reactor was not included in the EIS as it was not available for decommissioning at the time of the NEPA EIS and ISS was approved through the CERCLA process. Final disposition of N Reactor will be determined by a subsequent NEPA or CERCLA decision process. <ul style="list-style-type: none"> • <u>DOE and Ecology</u>, 2000, “Action Memorandum: United States Department of Energy Hanford 100 Area National Priorities List (NPL); 105-D and 105-H Reactor Facilities and Ancillary Facilities; Hanford Site; Benton County, Washington,” U.S. Department of Energy, Richland Operations Office and Washington State Department of Ecology, Richland, Washington, October. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Demolition of the reactor block in ISS and transport the reactor block intact on a tractor transporter from the present 100 Area location to the 200 West Area for disposal. • Safe storage for a period of up to 75 years of surveillance, monitoring, and maintenance at the end of the safe storage period, demolition of the reactor block and transport of the reactor block intact on a tractor transporter from the present 100 Area location to the 200 West Area for disposal. • Safe storage for a period of up to 75 years of surveillance, monitoring, and maintenance at the end of the safe storage period, demolition of the reactor buildings and piece-by-piece dismantlement of the reactor core and transport of radioactive waste to the 200 West Area for burial. Demolition of the reactor buildings and SSE and filling voids beneath and around the reactor block, the reactor block, adjacent shield walls, and the spent fuel storage basin together with the contained radioactivity, gravel, and grout covered to a depth of at least 5 meters with a mound containing earth and gravel. 	
CLEANUP ACTION:	RC-2 River Corridor – Disposition 100 Area K West Basin
Cleanup Decision Summary and Relevant Decision Documents An interim ROD, ROD amendment, and action memorandum are in place for the removal, treatment, and interim onsite storage of spent nuclear fuel and sludge from the K Basins. <ul style="list-style-type: none"> • <u>EPA/ROD/R10-99/059</u>, 1999, <i>Declaration of the Record of Decision for the 100-KR-2 Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>DOE and EPA</u>, 2004, <i>Action Memorandum: Request for Time Critical Response for Treatment and Disposal of Sludge from the 105-K East North Loadout Pit, USDOE Hanford Site</i>, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, June 4. • <u>EPA</u>, 2005, <i>Interim Remedial Action Record of Decision Amendment, Declaration, U.S. Department of Energy, 100 K Area K Basins, Hanford Site - 100 Area, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Remove, treat, and transfer sludge for interim storage at T Plant; transfer fuel scrap for interim storage at Canister Storage Building; D4 K West Basin and ancillary structures; remediate below-grade portions consistent with 100 Area contaminated soil sites.* <p>* May require removing K Reactors to access below-grade contaminated soils. K East Basin was demolished in 2009.</p>	
CLEANUP ACTION:	RC-3 River Corridor – Remediate 100 Area Contaminated Soil Sites
Cleanup Decision Summary and Relevant Decision Documents Interim RODs, ROD amendments, ESDs, and Annual Fact Sheets (100 Area “Plug-In” and Candidate Waste Sites for FY 2010) are in place to remove contaminated soil, structures, debris, and burial grounds using the observational and plug-in approaches with onsite disposal at ERDF. <ul style="list-style-type: none"> • <u>EPA</u>, 2004, <i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. 	

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

- EPA, 2007, *Explanation of Significant Difference for the Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, and 100-KR-2 Operable Units (100 Area Burial Grounds)*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2009a, *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA, 2011, *Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-95/126, 1995, *Declaration of the Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/AMD/R10-97/044, 1997, *Amendment to the Interim Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-99/039, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ESD/R10-00/045, 2000, *Explanation of Significant Difference for the 100 Area Remaining Sites ROD, USDOE Hanford 100 Area, 100-IU-6 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-00/120, 2000, *Interim Remedial Action Record of Decision for the 100-NR-1 Operable Unit, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ESD/R10-03/605, 2003, *Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- EPA/ROD/R10-00/121, 2000, *Declaration of the Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-2, 100-HR-2, 100-KR-2 Operable Units*, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington.
- *Resource Conservation and Recovery Act of 1976, (42 USC 6901), et seq.*

Range of Plausible Alternatives

- RTD contaminated soil sites to achieve RAOs* and applicable closure performance standards**; backfill, contour, and revegetate excavations.

Note: The 100 Area interim RODs for waste sites will be covered by the six final RODs for the River Corridor currently being worked through a final RI/FS process.

If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.

* In accordance with applicable interim action RODs.

** Closure of several 100-N facilities will be according to approved RCRA closure plans.

CLEANUP ACTION:	RC-4.1 River Corridor – Restore 100-BC-5 Groundwater OU to Beneficial Use
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Cleanup Decision Summary and Relevant Decision Documents

No cleanup decisions have been made for this OU; however, a proposed plan went through public review and the ROD is expected to be completed in late 2014. Groundwater monitoring and annual reporting continue to track groundwater contamination in this OU.

- WAC 173-340, “Model Toxics Control Act -- Cleanup,” *Washington Administrative Code*, Olympia, Washington.
- WAC 173-340-720, “Groundwater Cleanup Standards.”

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

Range of Plausible Alternatives	
<ul style="list-style-type: none"> • Install P&T system in 100-BC-5; transition to S&M for post-treatment groundwater monitoring. • Incorporate bioremediation for chromium. • Allow monitored natural attenuation to proceed under LTS with institutional controls. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	RC-4.2 River Corridor – Restore 100-KR-4 Groundwater OU to Beneficial Use
Cleanup Decision Summary and Relevant Decision Documents	
<p>An interim ROD is in place to clean up hexavalent chromium in the groundwater using P&T.</p> <ul style="list-style-type: none"> • <u>EPA, 2009d</u>, <i>Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>EPA/ROD/R10-96/134</u>, 1996, <i>Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> – <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.” 	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> • Expand the P&T system in 100-KR-4; transition to S&M for post-treatment groundwater monitoring. • Continue operation of P&T system with incorporation of bioremediation for chromium. • Allow monitored natural attenuation to proceed under LTS with institutional controls. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	RC-4.3 River Corridor – Restore 100-NR-2 Groundwater OU to Beneficial Use
Cleanup Decision Summary and Relevant Decision Documents	
<p>An action memorandum, interim ROD, and ESD are in place to clean up strontium-90 in the groundwater using P&T and physical barriers. An in situ apatite barrier and phytoremediation treatability tests are being evaluated for use in the cleanup of strontium-90 in groundwater.</p> <ul style="list-style-type: none"> • <u>EPA, 2011</u>, <i>Explanation of Significant Differences for the 100-NR-1 and 100-NR-2 Operable Units Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>EPA, 2010</u>, <i>Amended Record of Decision, Decision Summary and Responsiveness Summary U.S. Department of Energy 100-NR-1 and NR-2 Operable Units, Hanford Site – 100 Area, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>Ecology and EPA, 1994</u>, “Action Memorandum; N Springs Expedited Response Action Cleanup U.S. Department of Energy Hanford Site, Richland, WA” (letter to R. Izatt, U.S. Department of Energy, Richland Operations Office from R.F. Smith, U.S. Environmental Protection Agency and D. Butler, Washington State Department of Ecology), U.S. Environmental Protection Agency, Richland, Washington, September 23. • <u>EPA/ESD/R10-03/605</u>, 2003, <i>Explanation of Significant Difference for the 100-NR-1 Operable Unit Treatment, Storage, and Disposal Interim Action Record of Decision and 100-NR-1/100-NR-2 Operable Unit Interim Action Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>EPA/ROD/R10-99/112</u>, 1999, <i>Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> – <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.” 	

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

Range of Plausible Alternatives	
<ul style="list-style-type: none"> Resume operation of existing P&T system; operate and expand system as necessary until cleanup objectives are achieved; transition to S&M for post-treatment groundwater monitoring. Construct an impermeable barrier along the shoreline to redirect groundwater flow and increase travel times for radioactive decay to achieve cleanup objectives. Expand the apatite permeable reactive barrier to promote sequestration of strontium-90. Incorporate phytotechnology. Use sequestration and immobilization technologies for inner portion of strontium-90 plume. Allow monitored natural attenuation to proceed under LTS with institutional controls. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	RC-4.4 River Corridor – Restore 100-HR-3 Groundwater OU to Beneficial Use
Cleanup Decision Summary and Relevant Decision Documents	
<p>An interim ROD, ROD amendment, and ESDs are in place to clean up hexavalent chromium in the groundwater using P&T and an in situ reduction/oxidation (“redox”) manipulation barrier.</p> <ul style="list-style-type: none"> <u>EPA/ROD/R10-96/134</u>, 1996, <i>Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. <u>EPA/AMD/R10-00/122</u>, 1999, <i>Interim Remedial Action Record of Decision Amendment: 100-HR-3 Operable Unit</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. <u>EPA</u>, 2002, <i>Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. <u>EPA/ESD/R10-03/606</u>, 2003, <i>Explanation of Significant Difference for the 100-HR-3 Operable Unit Record of Decision, USDOE Hanford 100 Area, 100-HR-3 Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. <u>EPA</u>, 2009b, <i>Explanation of Significant Differences for the 100-HR-3 and 100-KR-4 Operable Units Interim Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.” 	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> Expand P&T system in 100-HR-3; transition to S&M for post-treatment groundwater monitoring. Maintain and repair in situ redox manipulation barrier. Incorporate bioremediation. Allow monitored natural attenuation to proceed under LTS with institutional controls. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

Table B-2. Summary of Future Cleanup Actions and Plausible Alternatives – River Corridor. (5 pages)

CLEANUP ACTION:	RC-5 River Corridor – Disposition 300 Area Facilities Retained By PNNL
Cleanup Decision Summary and Relevant Decision Documents Action memoranda are in place for the remaining 300 Area buildings and facilities, and DOE anticipates extending those cleanup decisions to include the PNNL-retained facilities once their operations end. DOE considers D&D of buildings and other structures to be final cleanup decisions if the facility is removed in accordance with an applicable action memorandum. The removal action work plan will need to be modified to address PNNL retained facilities once PNNL declares the facilities as surplus. Alternatives do not need to be considered where such D&D has been completed. Decision documents for D&D of 300 Area buildings and facilities that may have future application for the PNNL-retained facilities are listed here. <ul style="list-style-type: none"> • <u>DOE and EPA, 2005</u>, <i>Action Memorandum #1 for the 300 Area Facilities</i>, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, January 20. • <u>DOE and EPA, 2006a</u>, <i>Action Memorandum #2 for the 300 Area Facilities</i>, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, May 16. • <u>DOE and EPA, 2006b</u>, <i>Action Memorandum #3 for the 300 Area Facilities</i>, U.S. Department of Energy, Richland Operations Office and U.S. Environmental Protection Agency, Richland, Washington, November 30. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Following end of operational period for PNNL facilities (assumed no earlier than 2023), D4 all buildings and facilities; remediate consistent with 300 Area contaminated soil sites if needed. 	
D4 = deactivate, decontaminate, decommission, and demolish. D&D = decontamination and decommission. DOE = U.S. Department of Energy. EIS = environmental impact statement. ERDF = Environmental Restoration Disposal Facility. ESD = explanation of significant differences. FFTF = Fast Flux Test Facility. ISS = interim safe storage. LTS = long-term stewardship. NEPA = <i>National Environmental Policy Act of 1969</i> .	OU = operable unit. P&T = pump-and-treat. PNNL = Pacific Northwest National Laboratory. RAO = remedial action objective. RCRA = <i>Resource Conservation and Recovery Act</i> . RI/FS = remedial investigation/feasibility study. ROD = record of decision. RTD = remove, treat, and dispose. S&M = surveillance and maintenance. SSE = safe storage enclosure. WAC = <i>Washington Administrative Code</i> .
¹ RC-1 River Corridor – Disposition 100 Area Reactors (Except B Reactor) was removed from the LCR in response to comments that the 1993 National Environmental Policy Act ROD is considered a final action (see Appendix A, Table A-3)	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-1 Central Plateau – Disposition Remaining Outer Area Buildings and Facilities
Cleanup Decision Summary and Relevant Decision Documents Action memoranda are in place to D4 buildings and facilities to slab-on-grade and evaluate below-grade portions for contamination. Future cleanup decisions for remaining buildings and facilities will be included in decision documents (e.g., action memoranda, RODs). DOE considers D&D of buildings and other structures to be final cleanup decisions if all regulated contaminants have been removed in accordance with an applicable action memorandum. Alternatives do not need to be considered where such D&D has been completed. <ul style="list-style-type: none"> • <u>DOE/RL-2008-80-ADD1</u>, 2010, <i>Action Memorandum for the Non-Time Critical Removal Action for the 212-N, 212-P, and 212-R Facilities, Addendum 1: Disposition of Railcars</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2010-22</u>, 2010, <i>Action Memorandum for General Hanford Site Decommissioning Activities</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions consistent with Central Plateau Outer Area contaminated soil sites. 	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-2 Central Plateau – Remediate Remaining Outer Area Contaminated Soil Sites (200-OA-1, 200-CW-1, and 200-CW-3 OUs)
Cleanup Decision Summary and Relevant Decision Documents An interim ROD, ESD, and action memoranda are in place to remove contaminated soil, structures, and debris with disposal at ERDF. Future cleanup decisions for remaining soil sites will be included in decision documents (e.g., action memoranda, RODs). <ul style="list-style-type: none"> • <u>EPA/ROD/R10-99/039</u>, 1999, <i>Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>EPA, 2009a</u>, <i>Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>DOE/RL-2009-48</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • RTD contaminated soil sites to achieve RAOs comparable to 100 Areas; backfill, contour, and revegetate excavations. • RTD all sites except ponds; allow monitored natural attenuation for large pond sites with presence of existing vegetated soil covers. • Allow monitored natural attenuation to proceed for all sites with appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-3 Central Plateau – Disposition Below-Grade Portions of Plutonium Finishing Plant
Cleanup Decision Summary and Relevant Decision Documents A non-time critical action memorandum is in place, associated TPA milestone decision documents are approved, and D4 activities are being completed for above-grade structures of PFP. Final decisions and cleanup actions have not been made for below-grade structures/contaminated areas and are not identified in the action memorandum. <ul style="list-style-type: none"> • <u>DOE/RL-2005-13</u>, 2005, <i>Action Memorandum for the Plutonium Finishing Plant, Above-Grade Structures Non-Time Critical Removal Action</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Evaluate below-grade portions for residual contamination; leave remaining below-grade structures and contaminated areas in-place and transition to LTS with appropriate institutional controls. • RTD all PFP below-grade structures and contaminated areas; backfill and revegetate. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-4 Central Plateau – Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU)
Cleanup Decision Summary and Relevant Decision Documents Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs). <ul style="list-style-type: none"> • <u>DOE/RL-2009-48</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

<ul style="list-style-type: none"> • <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Remove all contents and D4 B Plant Canyon Building, including below-grade foundation; remove all contaminated materials, associated waste sites, and contaminated soils to achieve RAOs; dispose all waste and debris at approved facility. • Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking. • Condition contents, retrieve associated waste site contaminated soils and debris, and place in B Plant Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking. • Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	CP-5 Central Plateau – Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU)
Cleanup Decision Summary and Relevant Decision Documents <p>Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs).</p> <ul style="list-style-type: none"> • <u>DOE/RL-2009-48</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Remove all contents and D4 PUREX Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soils to achieve RAOs; dispose all waste and debris at approved facility. • Condition contents to place in spaces below canyon deck level; stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking. • Condition contents, retrieve associated waste site contaminated soils and debris, and place in PUREX Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking. • Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>Note: Cleanup decisions affecting disposition of the PUREX Canyon Building/associated waste sites and disposition of PUREX Storage Tunnels should be aligned and cleanup actions should be coordinated and integrated as much as practical.</p>	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-6 Central Plateau – Disposition PUREX Storage Tunnels (200-CP-1 OU)
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made for the PUREX Storage Tunnels. <ul style="list-style-type: none"> TBD – No decision documents currently available. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> Maintain safe storage, perform hazardous waste facility closure consistent with RCRA Permit, remediate radionuclides consistent with CERCLA, and conduct post-closure monitoring. Stabilize waste and prepare tunnels for in-place disposal, install barrier, perform post-closure care and transition to LTS. Remove and dispose waste and contaminated equipment from tunnels, evaluate tunnels for residual contamination; if needed, remediate tunnels consistent with 200 East Inner Area contaminated soil sites. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness. Note: Cleanup decisions affecting disposition of PUREX Storage Tunnels and disposition of PUREX Canyon Building/associated waste sites should be aligned and cleanup actions should be coordinated and integrated as much as practical.	
CLEANUP ACTION:	CP-7 Central Plateau – Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU)
Cleanup Decision Summary and Relevant Decision Documents Several action memoranda are in place to remove contaminated soil, structures, and debris from waste sites with disposal at ERDF. Future cleanup decisions for remaining buildings and waste sites will be included in decision documents (e.g., action memoranda, RODs). <ul style="list-style-type: none"> DOE/RL-2009-48, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 11 Waste Sites in 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. DOE/RL-2009-37, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. DOE/RL-2009-86, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> Remove all contents and D4 REDOX Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soil to achieve RAOs; dispose all waste and debris at approved facility. Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated waste and soil from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking. Condition contents, retrieve associated waste site contaminated soil and debris, and place in REDOX Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking. Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of wastes from cleanup activities. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-8 Central Plateau – Disposition T Plant Canyon Building/Associated Waste Sites
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made for the T Plant Canyon Building and Associated Waste Sites. Current expectations are that T Plant will continue to be used to support other remediation and waste management work. <ul style="list-style-type: none"> TBD – No decision documents currently available. 	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

Range of Plausible Alternatives	
<ul style="list-style-type: none"> Continue ongoing operations until 2036; transition to D4 in 2038; fulfill hazardous waste facility closure obligations consistent with RCRA Permit. Remove all contents and D4 T Plant Canyon Building including below-grade foundation; remove all contaminated materials, associated waste sites and contaminated soil to achieve RAOs; dispose all waste and debris at approved facility. Condition contents for placement in spaces below canyon deck level; stabilize and fill voids; remove contaminated wastes and soils from associated waste sites and dispose at approved facility; partially demolish building to canyon deck level; place engineered barrier over demolished structure; maintain institutional controls and perform post-closure monitoring and caretaking. Condition contents, retrieve associated waste site contaminated soil and debris, and place in T Plant Canyon for entombment; stabilize and fill voids; surround with clean fill and place an engineered barrier over the canyon building; maintain institutional controls and perform post-closure monitoring and caretaking. Same as preceding (entombment) alternative, with addition of disposal capability to allow receipt of waste from cleanup activities. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	CP-9 Central Plateau – Disposition Cesium/Strontium Capsules
Cleanup Decision Summary and Relevant Decision Documents	
<p>No cleanup decisions have been made for final disposition of the cesium/strontium capsules. Decisions have been deferred to future decision-making processes.</p> <ul style="list-style-type: none"> TBD – No decision documents currently available. 	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> Package and transport capsules from WESF to dry storage; store capsules pending final disposition; direct dispose of capsules at a geologic repository. Incorporate capsules into immobilized high-level waste glass at WTP. Store capsules at Hanford for 300 years (approximately 10 half-lives); after natural decay, direct dispose of capsules as mixed low-level radioactive waste. 	
CLEANUP ACTION:	CP-10 Central Plateau – Remediate 200-SW-1 OU*
Cleanup Decision Summary and Relevant Decision Documents	
<p>No cleanup decisions have been made for the 200-SW-1 OU.</p> <ul style="list-style-type: none"> TBD – No decision documents currently available. 	
Range of Plausible Alternatives	
<p>The following alternatives are being considered as part of <u>DOE/EA-1707D, Environmental Assessment Closure of Nonradioactive Dangerous Waste Landfill (NRDWL) and Solid Waste Landfill (SWL)</u>; these alternatives are not intended to presume the outcome of the ongoing environmental assessment process:</p> <ul style="list-style-type: none"> Install an evapotranspiration barrier over both landfills; upgrade monitoring and infrastructure systems; perform post-closure monitoring and caretaking. Partial RTD with removal of waste material from both landfills and impacted soil as deep as 10 feet below the waste material; backfill and revegetate; if necessary (e.g., contaminated residues remain), perform post-closure monitoring and caretaking. Remove all waste material from both landfills; excavate and RTD all contaminated soil to groundwater, if necessary; backfill and revegetate. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>* Includes NRDWL and SWL.</p>	
CLEANUP ACTION:	CP-11 Central Plateau – Disposition Remaining Liquid Waste Disposal Facilities*
Cleanup Decision Summary and Relevant Decision Documents	
<p>No cleanup decisions have been made for the Remaining Liquid Waste Disposal Facilities.</p> <p>TBD – No decision documents currently available.</p>	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

Range of Plausible Alternatives <ul style="list-style-type: none"> • Closure of facilities will be according to approved operating plans and closure plans. • If needed, may remediate contaminated soil under zone closure; may include partial RTD with various capping alternatives; monitoring and institutional controls after closure may be required. • RTD all contaminated soil; backfill and revegetate. • Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p> <p>* Includes State-Approved Land Disposal Site; State Waste Discharge Permit Sites; 100-N Sewage Lagoon; onsite Sewage Systems; National Pollutant Discharge Elimination System Outfalls; and Underground Injection Control Well Sites.</p>	
CLEANUP ACTION:	CP-12 Central Plateau – Disposition Remaining Waste Treatment, Storage and Disposal Facilities*
Cleanup Decision Summary and Relevant Decision Documents <p>No cleanup decisions have been made for the Remaining Waste Treatment, Storage and Disposal Facilities.</p> <ul style="list-style-type: none"> • TBD – No decision documents currently available. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Closure of facilities will be according to approved operating plans and closure plans (e.g., RCRA Closure Plans); consequently, cleanup actions will be determined and accomplished in accordance with applicable regulatory and permit/license requirements. No other alternatives are being considered. <p>* Includes LERF/ETF, WESF, WRAP, 222-S Laboratory, IDF, and Inert Waste Landfill/Pit 9.</p>	
CLEANUP ACTION:	CP-13 Central Plateau – Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks 200-IS-1 OU
Cleanup Decision Summary and Relevant Decision Documents <p>The 200-IS-1 OU waste sites include tanks (except to be included in the Tank Farms), pipelines, pits, diversion boxes, and associated ancillary equipment. Several pipelines are being addressed (in part) per 200-MG-1 removal actions; final remediation decisions will be addressed in RODs; TSD ancillary equipment will be addressed in future RCRA Closure Plan(s); other media may be addressed via CERCLA process.</p> <ul style="list-style-type: none"> • TBD – No decision documents currently available. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • RTD all contaminated equipment, materials, debris and soil to a depth that is determined by the Tri-Party agencies to be protective of human health and ecological resources (depth TBD); backfill and revegetate. • RTD all contaminated equipment, materials, debris and soil; backfill and revegetate. • Stabilize select equipment in place using technologies yet to be determined. • Leave everything in place; maintain under LTS with appropriate institutional controls. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	CP-14 Central Plateau – Remediate Land Disposal Units (200-SW-2 OU)
Cleanup Decision Summary and Relevant Decision Documents <p>No cleanup decisions have been made to remediate the 200-SW-2 OU. (Note that this OU is not a single contaminated site, but comprises a large number of land disposal units.)</p> <ul style="list-style-type: none"> • TBD – No decision documents currently available. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Excavation, treatment (as necessary), and disposal of all waste from within individual landfills. • Excavation, treatment (as necessary), and disposal of waste from selected sections of individual landfills followed by capping of remaining waste; includes continued cap maintenance and monitoring. • Capping of individual landfills; includes continued cap maintenance and monitoring. • In situ treatment/stabilization (e.g., vitrification or grouting) of portions of individual landfills followed by capping; includes continued cap maintenance and monitoring. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

CLEANUP ACTION:	CP-15 Central Plateau – Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200-WA-1 OU)
Cleanup Decision Summary and Relevant Decision Documents Several action memoranda are in place to remove contaminated soil, structures, and debris from 200 West Inner Area soil sites with disposal at ERDF. Future cleanup decisions for remaining waste sites will be included in decision documents (e.g., action memoranda, RODs). <ul style="list-style-type: none"> • <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • RTD approximately half of waste sites and cap remainder. • RTD all waste sites; backfill and revegetate. • Cap and maintain under LTS with monitoring and appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-16 Central Plateau – Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU)
Cleanup Decision Summary and Relevant Decision Documents Several action memoranda are in place to remove contaminated soil, structures, and debris from 200 East Inner Area soil sites with disposal at ERDF. Future cleanup decisions for remaining waste sites will be included in decision documents (e.g., action memoranda, RODs). <ul style="list-style-type: none"> • <u>DOE/RL-2009-37</u>, 2009, <i>Action Memorandum for Non-Time-Critical Removal Action for 200-MG-2 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. • <u>DOE/RL-2009-86</u>, 2010, <i>Action Memorandum for Non-Time-Critical Removal Action for 37 Waste Sites in the 200-MG-1 Operable Unit</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • RTD approximately half of waste sites and cap remainder. • RTD all waste sites; backfill and revegetate. • Cap and maintain under LTS with monitoring and appropriate institutional controls. If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.	
CLEANUP ACTION:	CP-17 Central Plateau – Disposition Fast Flux Test Facility (FFTF) Complex
Cleanup Decision Summary and Relevant Decision Documents In 1995, DOE determined FFTF would be deactivated. Other decisions have been deferred to future decision-making processes. <ul style="list-style-type: none"> • TBD – No decision documents currently available. 	
Range of Plausible Alternatives The following reflect alternatives considered as part of <u>DOE/EIS-0391</u> , <i>Final Tank Closure and Waste Management Environmental Impact Statement</i> (TC&WM EIS); these alternatives are not intended to presume the outcome of the environmental impact decision process: <ul style="list-style-type: none"> • Entombment – Consolidate buildings and waste, compact, and fill void spaces in the reactor containment building and contaminated ancillary buildings; install a landfill barrier over remaining structures and extend as needed to cover contaminated below-grade portions. • Removal – Remove contaminated equipment and structures; reduce above-grade portions of reactor containment building and ancillary buildings to slab-on-grade; backfill with soil, compact and stabilize remaining below-grade portions; contour and revegetate. • Remove and treat remote-handled special components onsite or at INL; dispose treated components at IDF or Nevada Test Site. 	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

<ul style="list-style-type: none"> Store sodium; convert to caustic sodium hydroxide solution onsite or at INL; reuse caustic sodium hydroxide solution for tank corrosion control or processing tank waste at WTP. Leave structures in place with inert gas blanket for sodium residuals; transition to LTS with appropriate institutional controls. 	
CLEANUP ACTION:	CP-18 Central Plateau – Disposition Remaining Buildings and Facilities in FFTF Complex
Cleanup Decision Summary and Relevant Decision Documents In 1995, DOE determined FFTF would be deactivated. Other decisions have been deferred to future decision-making processes. <ul style="list-style-type: none"> TBD – No decision documents currently available. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> D4 all buildings per appropriate removal action work plan; if needed, remediate below-grade portions. Leave structures in place and transition to LTS with appropriate institutional controls. 	
CLEANUP ACTION:	CP-19 Central Plateau –Disposition Remaining Inner Area Buildings and Facilities
Cleanup Decision Summary and Relevant Decision Documents Cleanup decisions have been made for D&D of some of the Remaining Inner Area Buildings and Facilities, and the applicable action memorandum is expected to cover future D&D activities. DOE considers D&D of buildings and other structures to be final cleanup decisions if all regulated contaminants have been removed in accordance with an applicable action memorandum. Alternatives do not need to be considered where such D&D has been completed. (Note that cleanup decisions have been or will be made for the Canyon Buildings and Associated Waste Sites; see separate cleanup actions for these facilities.) <ul style="list-style-type: none"> DOE/RL-2010-22, 2010, <i>Action Memorandum for General Hanford Site Decommissioning Activities</i>, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions consistent with contiguous contaminated soil sites. Leave structures in place and transition to LTS with appropriate institutional controls. 	
CLEANUP ACTION:	CP-20 Central Plateau – Remediate Contaminated Deep Vadose Zone (200-DV-1 OU)
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made for the Deep Vadose Zone. <ul style="list-style-type: none"> TBD – No decision documents currently available. 	
Range of Plausible Alternatives <ul style="list-style-type: none"> Implement results of treatability testing in accordance with CERCLA and/or RCRA final decisions. RTD all contaminated soils to groundwater if necessary and technically practical; backfill and revegetate. In place treatment to destroy, immobilize, or capture, treat and dispose contaminants. Soil flushing with P&T or pore water removal. Install surface barriers. Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls. 	
CLEANUP ACTION:	CP-21 Central Plateau – Restore 200 West Groundwater To Beneficial Use (200-UP-1 OU)
Cleanup Decision Summary and Relevant Decision Documents An interim ROD for 200-UP-1 OU was issued in September 2012 that superseded the previous remedy decisions for this OU and a final ROD is in place for the 200-ZP-1 OU to address all contaminants. <ul style="list-style-type: none"> EPA, 2012, <i>Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site, 200-UP-1 Operable Unit</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. EPA/ROD/R10-95/114, 1995, <i>Declaration of the Interim Record of Decision for the 200-ZP-1 Operable Unit</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. EPA/ROD/R10-97/048, 1997, <i>Declaration of the Record of Decision, USDOE Hanford 200-UP-1 Operable Unit, 200 Area, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. 	

Table B-3. Summary of Future Cleanup Actions and Plausible Alternatives – Central Plateau. (9 pages)

<ul style="list-style-type: none"> • <u>EPA, 2009c</u>, <i>Explanation of Significant Differences for the Interim Action Record of Decision for the 200-UP-1 Groundwater Operable Unit, Hanford Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>EPA, 2008</u>, <i>Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington</i>, U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Olympia, Washington. • <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> – <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.” 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Expand 200-ZP-1 extraction, treatment and injection capacity; install extraction and transfer system for 200-UP-1; operate P&T system to achieve RAOs; continue monitoring. • Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls. • Hydraulic containment of the iodine-129 groundwater plume. • Groundwater monitoring and institutional controls. 	
CLEANUP ACTION:	CP-22 Central Plateau – Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 OUs)
Cleanup Decision Summary and Relevant Decision Documents No cleanup decisions have been made for 200 East Groundwater. <ul style="list-style-type: none"> • <u>WAC 173-340</u>, “Model Toxics Control Act -- Cleanup,” <i>Washington Administrative Code</i>, Olympia, Washington. <ul style="list-style-type: none"> – <u>WAC 173-340-720</u>, “Groundwater Cleanup Standards.” 	
Range of Plausible Alternatives <ul style="list-style-type: none"> • Install P&T system for 200-BP-5 OU; implement monitored natural attenuation for 200-PO-1 OU; perform well support and maintenance activities. • Allow monitored natural attenuation to proceed under LTS with appropriate institutional controls. • Install P&T system for 200-BP-5 and selective P&T for 200-PO-1 hot spots. Note: 400 Area groundwater cleanup actions are included as part of 200-PO-1 OU.	
CERCLA = <i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i> D&D = decontamination and decommission. D4 = deactivation, decontamination, decommissioning, and demolition. DOE = U.S. Department of Energy. ERDF = Environmental Restoration Disposal Facility. ESD = explanation of significant difference. ETF = Effluent Treatment Facility. FFTF = Fast Flux Test Facility. IDF = Integrated Disposal Facility. INL = Idaho National Laboratory. LERF = Liquid Effluent Retention Facility. LTS = long-term stewardship. NRDWL = Nonradioactive Dangerous Waste Landfill. OU = operable unit.	P&T = pump-and-treat. PFP = Plutonium Finishing Plant. PUREX = Plutonium-Uranium Extraction (Plant). RAO = remedial action objective. RCRA = <i>Resource Conservation and Recovery Act of 1976.</i> REDOX = reduction-oxidation. ROD = record of decision. RTD = remove, treat, and dispose. SWL = solid waste landfill. TBD = to be determined. TPA = Tri-Party Agreement. TSD = treatment, storage, and disposal. WAC = <i>Washington Administrative Code.</i> WESF = Waste Encapsulation and Storage Facility. WRAP = Waste Receiving and Processing Plant. WTP = Waste Treatment and Immobilization Plant.

Table B-4. Summary of Future Cleanup Actions and Plausible Alternatives – Tank Waste. (2 pages)

CLEANUP ACTION:	TW-1 Tank Waste – Tank Retrieval and Single-Shell Tank Farm Closure
Cleanup Decision Summary and Relevant Decision Documents	
In the February 26, 1997 <i>Federal Register</i> , DOE decided to retrieve and treat tank waste (62 FR 8693). Further decisions have been deferred to future decision-making processes.	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> Retrieve SST wastes (assumes two retrieval technologies) to meet milestones in the Consent Decree (DOE and Ecology, 2010); achieve designated retrieval objectives or limits of technology; remediate structures and soil and install cover/cap to meet closure performance standards; maintain post-closure care and monitoring consistent with RCRA Permit. <p>The following reflect alternatives considered as part of the TC&WM EIS (DOE/EIS-0391); these alternatives are not intended to presume the outcome of the environmental impact decision process:</p> <ul style="list-style-type: none"> Grout, cap and close SSTs with residual waste in place; monitor and implement institutional controls after closure; eventual transition to LTS. Construct new DST capacity sufficient to complete SST retrieval; close SSTs and implement post-closure care, monitoring, and institutional controls; eventual transition to LTS. RTD some SSTs and ancillary facilities, residual waste, and contaminated soils; backfill and revegetate. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	
CLEANUP ACTION:	TW-2 Tank Waste – Tank Waste Treatment
Cleanup Decision Summary and Relevant Decision Documents	
In the February 26, 1997 <i>Federal Register</i> , DOE decided to retrieve, separate, vitrify, and dispose the tank waste (62 FR 8693). The ILAW would be prepared for onsite disposal and the vitrified HLW would be placed in interim storage pending future disposal at a national geologic repository. Further decisions have been deferred to future decision-making processes.	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> Pretreat, condition and immobilize tank wastes in the WTP to meet TPA milestones and comply with RCRA Permit; operate supplemental treatment systems (assumed to be second LAW) to augment WTP capacity; place immobilized waste in canisters; transfer ILAW for disposal at the IDF; provide capacity to store all immobilized HLW in Hanford Shipping Facility or Interim Hanford Storage Facility (new) until a final repository is available. Perform blending and waste characterization at a new Enhanced Waste Receiving Facility. 	
CLEANUP ACTION:	TW-3 Tank Waste – Secondary Waste Treatment
Cleanup Decision Summary and Relevant Decision Documents	
No cleanup decisions have been made. Decisions have been deferred to future decision-making processes.	
<ul style="list-style-type: none"> TBD – No decision documents currently available. 	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> Recycle liquid waste streams in WTP; manage residual liquid waste at LERF/ETF/SALDS; treat solid waste from WTP and ETF and dispose at IDF; manage and disposition other secondary waste (e.g., failed melters). <p>Other plausible alternatives will be determined at a later date.</p> <p>Note: Any radioactive HLW will be stored and eventually shipped to a geologic repository.</p>	
CLEANUP ACTION:	TW-4 Tank Waste – Double-Shell Tank Closure
Cleanup Decision Summary and Relevant Decision Documents	
No cleanup decisions have been made. Decisions have been deferred to future decision-making processes.	
Range of Plausible Alternatives	
<ul style="list-style-type: none"> Retrieve DST wastes consistent with TPA; achieve designated retrieval objectives or limits of technology; remediate structures and soil and install cover/cap to meet closure performance standards; maintain post-closure care and monitoring consistent with RCRA Permit. RTD DSTs and ancillary facilities, residual waste, and contaminated soil; backfill and revegetate. Stabilize, cap and close DSTs with residual waste in place; monitor and implement institutional controls after closure; eventual transition to LTS. <p>If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.</p>	

Table B-4. Summary of Future Cleanup Actions and Plausible Alternatives – Tank Waste. (2 pages)

CLEANUP ACTION:	TW-5 Tank Waste – WTP Closure			
Cleanup Decision Summary and Relevant Decision Documents				
The RCRA Hanford Dangerous Waste Permit, Operable Unit-10, Chapter 11 states “Clean closure is the goal for the WTP. The closure plan will be revised if efforts to achieve the clean closure standards for the WTP structures or soil are unsuccessful. The “modified closure” approach may be followed if feasible, as provided in Condition II.K.3 of the Hanford RCRA Permit. It also may be closed as a landfill, as provided in Condition II.K.4 of the Hanford RCRA Permit, if the clean closure standards are not technically or economically feasible. The revised closure plan will be accompanied by a written request for modification of the permit.” Further decisions have been deferred to future decision-making processes.				
<ul style="list-style-type: none">WA7890008967, 2013, <i>Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste</i>, Washington State Department of Ecology, Nuclear Waste Program, Richland, Washington, September 30.				
Range of Plausible Alternatives				
<ul style="list-style-type: none">Demolish ancillary facilities/structures to the primary containment structure; seal containment structure and construct a soil-based environmental barrier over the containment structure; remediate structures and soils; maintain post-closure care and monitoring consistent with RCRA Permit.D4 all buildings and facilities to slab-on-grade; evaluate below-grade portions for residual contamination; if needed, remediate below-grade portions.Perform clean closure of WTP and all ancillary facilities/structures.Leave structures in place and transition to LTS with appropriate institutional controls.				
If residual contamination remains after cleanup actions are completed, cleanup work will transition to LTS, including institutional controls and 5-year reviews of remedy effectiveness.				
D4	= deactivation, decontamination, decommissioning, and demolition.	LTS	= long-term stewardship.	
DOE	= U.S. Department of Energy.	RCRA	= <i>Resource Conservation and Recovery Act of 1976</i> .	
DST	= double-shell tank.	RTD	= remove, treat, and dispose.	
ETF	= Effluent Treatment Facility.	SALDS	= State-Approved Land Disposal Site.	
HLW	= high-level waste.	SST	= single-shell tank.	
IDF	= Integrated Disposal Facility.	TBD	= to be determined.	
ILAW	= immobilized low-activity waste.	TC&WM EIS	= Tank Closure and Waste Management Environmental Impact Statement.	
LAW	= low-activity waste.	TPA	= Tri-Party Agreement.	
LERF	= Liquid Effluent Retention Facility.	WTP	= Waste Treatment and Immobilization Plant.	

B.2.2 DOE’S APPROACH FOR ANALYZING ALTERNATIVES AND DESCRIBING THE REASONABLE UPPER BOUND

TPA M-036-01 refers to a “reasonable upper bound” with respect to presenting information about cleanup alternatives, but the milestone does not include a ready definition for “reasonable upper bound.” To ensure the LCR provides information that meets the requirement and intent of the milestone, DOE has relied on a conceptual framework as described in the 2013 LCR (Appendix A, Section A.2.2).

B.3 RATIONALE FOR ANNUAL SELECTION OF FUTURE CLEANUP ACTIONS TO BE ANALYZED

DOE will consider recommendations from EPA and Ecology, government-to-government consultations (e.g., Tribal Nations, Oregon), Hanford Advisory Board advice, input from Hanford stakeholders, and public comments received on previous LCRs selecting the future cleanup actions to be analyzed in the LCR. Additional details regarding the rationale used to select the future cleanup actions to be analyzed in the LCR are described in the 2013 LCR (Appendix A, Section A.3).

B.4 COMPLETED CLEANUP ACTION ALTERNATIVES

The cleanup actions that have been analyzed in-depth in LCRs are summarized in Table B-5. For details about the cost estimate alternative analysis of any of these cleanup actions, see the specific LCR referenced in Table B-5.

2011 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2010-25)		
Cleanup Action	Cost Estimate Alternative Analysis (Million \$)	Final Decision Reference
River Corridor–Disposition 100 Area Reactors	Reactors Remain in Place - \$0 Remove Reactors - \$676	Record of Decision; Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, WA (58 <u>FR</u> 48509)
Central Plateau–Remediate 200-SW-2 OU	Barriers - \$823 Remove, Treat, Dispose of Waste - \$16,614	TBD
2012 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2011-93)		
Cleanup Action	Cost Estimate Alternative Analysis (Million \$)	Final Decision Reference
Tank Waste Cleanup Action– Tank Retrieval and Single-Shell Tank Farm Closure	1 – Baseline Case - \$59,900 2 – TRU Waste to WTP - \$61,600 3 – FBSR for supplemental treatment - \$58,100	TBD
Tank Waste Cleanup Action– Tank Waste Treatment	4 – WTP delay with +10% vitrification capacity - \$66,000	TBD
Tank Waste Cleanup Action– Secondary Waste Treatment	5 – 2020 Vision One System - \$58,000 6 – WTP delay with new DST farm - \$68,700 7 – Enhanced tank waste strategy - \$57,300 8 – Accelerated SST retrievals - \$62,800 9 – Early U Farm closure - \$59,600 10 – Slow SST retrievals - \$60,800	TBD
2013 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2012-13)		
Cleanup Action	Cost Estimate Alternative Analysis (Million \$)	Final Decision Reference
Central Plateau-Remediate Remaining Outer Area Contaminated Soil Sites (200- OA-1, 200-CW-1, and 200-CW-3 OUs)	The DOE planning case cleanup remedies for the 190 waste sites evaluated includes: RTD - \$98.3 CSNA - \$4.9 MESC/MNA/IC - \$3.2	TBD
Central Plateau-Remediate Remaining 200 West Inner Area Contaminated Soil Sites (200- WA-1 OU)	IBAR - \$19.2 <u>ABAR - \$19.8</u> Total - \$145.4	TBD
2014 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2013-02)		
Cleanup Action	Cost Estimate Alternative Analysis (Million \$)	Final Decision Reference
None selected for 2014	N/A	N/A
2015 HANFORD LIFECYCLE SCOPE, SCHEDULE AND COST REPORT (DOE/RL-2014-11)		
Cleanup Action	Cost Estimate Alternative Analysis (Million \$)	Final Decision Reference
None selected for 2015	N/A	N/A
<div> <div> ABAR = aggregate barrier. CSNA = confirmatory sampling to support no further cleanup action. DOE = U.S. Department of Energy. DST = double-shell tank. FBSR = fluidized bed steam reformer. IBAR = individual barrier. IC = institutional controls. MESC = maintain existing soil cover. </div> <div> MNA = monitored natural attenuation. N/A = not applicable. OU = operable unit. RTD = remove, treat and dispose. SST = single-shell tank. TBD = to be determined. TRU = transuranic. WTP = Waste Treatment and Immobilization Plant. </div> </div>		

Table B-6. Anticipated Schedule for Detailed Analyses of Future Cleanup Action Alternatives. (3 pages)

Cleanup Action	Alternative
<ul style="list-style-type: none"> Central Plateau–Disposition B Plant Canyon Building/Associated Waste Sites (200-CB-1 OU) Central Plateau–Disposition PUREX Canyon Building/Associated Waste Sites (200-CP-1 OU) Central Plateau–Remediate Contaminated Deep Vadose Zone (200-DV-1 OU) 	Based on new TPA milestones for these canyon facilities, it is unlikely that extensive evaluation of alternatives will have been performed yet (e.g., in feasibility studies). It may be reasonable to develop alternatives after 2015 that could benefit future planning and budget requests.
<ul style="list-style-type: none"> Central Plateau–Restore 200 East Groundwater to Beneficial Use (200-PO-1/200-BP-5 OUs) 	TPA M-015-21A requires FS/proposed plan submittal by June 30, 2015. May be reasonable to develop alternatives in the 2016 LCR to benefit future planning and budget requests.
<ul style="list-style-type: none"> Central Plateau– Remediate Pipelines, Pits, Diversion Boxes and Associated Tanks (200-IS-1 OU) Central Plateau–Remediate Remaining 200 East Inner Area Contaminated Soil Sites (200-EA-1 OU) 	CERCLA/RCRA decision document submittals are scheduled by December 31, 2016 (TPA M-015-92B). Analyzing potential alternatives in the 2016 LCR could provide information to help inform the decision process.
<ul style="list-style-type: none"> Central Plateau–Disposition Below-Grade Portions of PFP Central Plateau–Remediate 200-SW-1 OU 	Cleanup is proceeding with existing decisions (e.g., interim ROD, action memorandum, RCRA interim status/final permit) and reflected in current planning documents. Final decisions could be made within 1-2 years of 2015 timeframe and are expected to be compatible with interim decisions. Prior to developing the 2016 LCR, decide whether alternatives should be analyzed based on status of final cleanup decision making.
<ul style="list-style-type: none"> River Corridor–Disposition 100 Area former orchard contaminated soil sites (100-OL-1 OU) 	TPA M-015-95 required RI/FS work plan submittal by April 30, 2013. May be reasonable to develop alternatives in the 2016 LCR or later that could benefit future planning and budget requests.
<ul style="list-style-type: none"> Central Plateau–Disposition FFTF Complex 	It is expected that the TC&WM EIS (DOE/EIS-0391) and final ROD will address decisions related to this cleanup action before cleanup must begin. If, instead, cleanup decisions have not been made, it may be timely to reassess whether the FFTF cleanup action could be analyzed.
<ul style="list-style-type: none"> Central Plateau–Disposition REDOX Canyon Building/Associated Waste Sites (200-CR-1 OU) 	May be reasonable to develop alternatives after 2016 that may benefit future planning/budget requests.
<ul style="list-style-type: none"> Central Plateau–Disposition Cesium/Strontium Capsules 	TPA M-092-05 requires DOE to determine a disposition path and establish interim milestones for the cesium/strontium capsules by June 30, 2017. Capsules are in safe storage; no immediate action is required. Other activities will provide data and potential problem resolutions that will enhance considering alternatives for management/disposition of the cesium/strontium capsules. Prior to the 2017 LCR, decide if alternatives would benefit future planning/budget requests.
<ul style="list-style-type: none"> Central Plateau–Restore 200 West Groundwater to Beneficial Use (200-UP-1 OU) 	An interim action ROD was issued in September 2012 that superseded the previous 200-UP-1 OU decisions. Deferral to after 2015 would allow final decisions to be made and coincide with subsequent CERCLA 5-year review.
<ul style="list-style-type: none"> River Corridor–Disposition 300 Area Facilities Retained by PNNL 	Facilities will be maintained operational by PNNL until 2023, which is the assumed date to start closure and disposition of the facilities. Earlier analysis of alternatives would be premature and not needed for out-year budget planning.

Table B-6. Anticipated Schedule for Detailed Analyses of Future Cleanup Action Alternatives. (3 pages)

Cleanup Action	Alternative
<ul style="list-style-type: none"> Central Plateau (Outer Area)–Disposition Remaining Outer Area Buildings and Facilities (200-OA-1 OU) 	The few remaining structures in the Outer Area do not present imminent or significant threats to health or environment. Cleanup actions are likely to be non-controversial and focused on RTD, with scope, schedule and cost accounted for in planning documents. Analysis of alternatives before 2016 is not likely to contribute useful information for out-year budget planning.
<ul style="list-style-type: none"> Central Plateau–Disposition PUREX Storage Tunnels (200-CP-1 OU) 	Prior to development of the 2017 LCR, decide whether development of alternatives would benefit future planning and budget requests.
<ul style="list-style-type: none"> Central Plateau–Disposition T Plant Canyon Building/Associated Waste Sites Central Plateau–Disposition Remaining Liquid Waste Disposal Facilities Central Plateau–Disposition Remaining Waste Treatment, Storage and Disposal Facilities 	These facility operations are integral to the long-term cleanup mission and will continue well after 2020. Any likely cleanup actions are not expected for at least 20+ years in the future so earlier analyses would be premature and not needed before 2018 for out-year budget planning.
<ul style="list-style-type: none"> Central Plateau–Disposition Remaining Buildings and Facilities Within FFTF Complex Central Plateau–Disposition Any Remaining Inner Area Buildings and Facilities 	Continuing with the current planning bases and uncertainties is sufficient for health and environmental protection and scope and budget planning before 2018. Information about conditions after other cleanup actions have occurred (e.g., disposition of FFTF) would be insufficient for useful analyses. It would be premature to analyze alternatives for cleanup actions before the 2018 LCR.
<ul style="list-style-type: none"> Tank Waste–Double-Shell Tank Closure Tank Waste–WTP Closure 	DST closure is not expected to begin before 2034 and WTP closure before 2050. No imminent or significant health/environmental concerns were identified that need to be addressed. Earlier planning and budget development would be unnecessary and not account credibly for future decisions and conditions.
CLEANUP ACTIONS FOR WHICH ALTERNATIVES WOULD NOT BE ANALYZED	
River Corridor–B Reactor Preservation - B Reactor is designated a National Historic Landmark and is a signature facility of the newly established Manhattan Project National Historical Park so no cleanup actions are anticipated. Minor conditioning/maintenance activities will be performed consistent with National Park Service decision making under the <i>National Environmental Policy Act (42 USC 4321)</i> and/or <i>National Historic Preservation Act (16 USC 470)</i> .	
River Corridor–Disposition Remaining 100 Area Buildings/Facilities and Disposition Remaining 300 Area Buildings/Facilities (except facilities retained for use by PNNL) - Although cleanup actions are ongoing for these buildings/facilities, excess buildings/facilities in the 100 and 300 Areas are expected to undergo D&D according to applicable action memoranda. DOE considers D&D of buildings/structures to be final cleanup decisions if all regulated contaminants are removed in accordance with an action memorandum so alternatives do not need to be analyzed.	
River Corridor–Remediate Remaining Contaminated Sites Within Hanford Reach National Monument - National Monument remediation is being implemented to fulfill obligations under a Presidential Proclamation that establishes a <i>de facto</i> final decision. RTD and decontamination in the Monument areas were substantially completed in 2012 (some residual cleanup in the 100 Area portions of the Monument is expected to be complete within the next few years as part of the River Corridor or Central Plateau cleanup projects).	
River Corridor - Disposition 100 Area K West Basin River Corridor - Remediate 100 Area Contaminated Soil Sites River Corridor - Restore 100-BC-5 Groundwater OU to Beneficial Use River Corridor - Restore 100-KR-4 Groundwater OU to Beneficial Use River Corridor - Restore 100-NR-2 Groundwater OU to Beneficial Use River Corridor - Restore 100-HR-3 Groundwater OU to Beneficial Use The Tri-Party agencies agreed that for cleanup actions close to having final decisions there would be little value in presenting a cost estimate alternatives analysis in the LCR. Because K West Basin cleanup action was limited to only one alternative (see Table B-2) the agencies agreed to remove it from the alternatives analysis in the LCR.	
Central Plateau–Disposition U Plant (Canyon Building/Associated Waste Sites) - U Plant remediation was approved according to a CERCLA Final ROD. If performed, further analysis of alternatives should be done as part of the process under which the current final cleanup decisions were made.	

Table B-6. Anticipated Schedule for Detailed Analyses of Future Cleanup Action Alternatives. (3 pages)

Cleanup Action		Alternative	
Central Plateau—Manage ERDF - ERDF was approved according to a CERCLA Final ROD and closure and post-closure care are part of the operating documentation. Alternatives need not be analyzed, unless future decisions are made that modify the current final ERDF decisions.			
CERCLA=	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980.</i>	PFP	= Plutonium Finishing Plant.
D&D	= decontamination and decommission.	PNNL	= Pacific Northwest National Laboratory.
DOE	= U.S. Department of Energy.	PUREX	= Plutonium-Uranium Extraction (Plant).
DST	= double-shell tank.	RCRA	= <i>Resource Conservation and Recovery Act of 1976.</i>
ERDF	= Environmental Restoration Disposal Facility.	REDOX	= Reduction-Oxidation (Facility).
FFTF	= Fast Flux Test Facility.	RI/FS	= remedial investigation/feasibility study.
FS	= feasibility study.	ROD	= record of decision.
LCR	= Lifecycle Report.	RTD	= remove, treat, and dispose.
OU	= operable unit.	TPA	= Tri-Party Agreement.
		WTP	= Waste Treatment and Immobilization Plant.

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